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Rural Electric Lines.

FROM time to time we have had occasion to deplore the tendency of our fellow-countrymen to tie their hands with elaborate rules and regulations, with little regard to the logic of circumstances—bonds which quickly prove irksome and in restraint of progress, but which once riveted it is most difficult to slacken or remove. Of such are the rules which govern the erection of overhead lines; from the first the Government, admittedly supported by public opinion in the early days, through the Board of Trade imposed upon the electricity supply industry standards of safety and reliability which might be suitable for a densely-populated area (in which, however, with customary inconsequence, it would not consent to the use of overhead lines), but were intolerably costly to comply with in sparsely settled country. Nevertheless, it cheerfully accepted the suspension of bare copper trolley wires over the most congested city streets, at twice the voltage above earth required for consumers' service lines.

On various occasions attempts have been made to obtain such modification of the Regulations for Overhead Lines as would permit of the erection of inexpensive lines in rural areas and thus enable electricity supply authorities to confer brightness and comfort on the residents, and changes have indeed been made, but unfortunately the desired object has by no means been achieved. In their annual report last year the Electricity Commissioners frankly blamed the electrical industry itself for the existing state of affairs, pointing out that they had adopted in its entirety a code suggested by a Special Committee appointed by the Institution of Electrical Engineers at their instigation: anxious as they were to encourage the wider use of electricity in rural areas, how could they discard that

code unless a definite case for amendment were shown to exist? That was the reply to an appeal emanating from a Joint Committee appointed by the I.M.E.A. and the Provincial Electric Supply Committee, and in conclusion the Commissioners suggested that the I.M.E.A. should confer with the Special Committee of the I.E.E.—a course which was adopted.

That the simplification and cheapening of overhead-line construction in rural areas has the sympathy of the Electricity Commissioners is certain; that it would be in accordance with the policy of the Government, whatever party were in office, is equally certain, the development of rural electricity supply being one of the cardinal principles embodied in the Act of 1926 and imposed upon the Central Electricity Board. The only opponents to the process appear to be found in the electrical industry itself! We are inclined to quote Sir Henry Campbell-Bannerman—but instead we propose to publish the opinions and cite the technical practice of men who are actually engaged in extending their networks into the country districts, in spite of the obstacles set in their path by the existing regulations of the Electricity Commissioners and the Postmaster-General, and that bugbear of all such pioneers—the difficulty of obtaining wayleaves. To that end we shall welcome contributions, not only from those whom we have invited to take part, but also from others who find themselves up against difficulties and have useful suggestions to offer for the benefit of their brother engineers and of the rural public. We regard the subject as one of the first importance, not only from the public-welfare point of view, but also from that of electrical development in general. As regards the former, every effort should be made to improve the conditions of living in the country, where the residents eagerly avail themselves of the advantages of electricity in the home and workshop; the farmer is displaying increased interest in the uses of electricity, and needs the help of cheap power to enable him to remain in business and to supply part, at least, of the nation's food; and the country load is essential to the working of the Act of 1926. With regard to the latter, no words are needed to show that the extended use of electricity brings employment to the electrical industry in all its branches, and the Electrical Development Association is keenly interested in the subject of rural electricity supply. We print in this issue a contribution to the subject by one who is both engineer and farmer—Mr. R. Borlase Matthews—and shall continue from time to time to insert articles by other experts, in the hope of promoting progress in this branch of electrical industry.

The I.E.E. Conversazione.

THE annual conversazione of the Institution of Electrical Engineers, which last week returned to the Natural History Museum, was well attended and admirably conducted, as usual. A notable incident was the presentation to Dr. Elihu Thomson, hon. member I.E.E., of the Faraday Medal; Dr. Thomson already held the Kelvin medal, and the Hughes medal of the Royal Society, and it will be universally agreed that all these high distinctions have been well earned. No one but Dr. Thomson holds all three medals.

Regarding the other novel feature of the proceedings—the spectacle, "Light Down the Ages: The Taming of Electricity"—opinion was not so harmonious. The organisers and performers are to be congratulated upon the results obtained under exceptional difficulties of time and space, and the lighting effects were striking and, in some respects, unique; but whether the occasion was well chosen for such a display is open to question. Members who expressed their views to us on the subject at the time and later, including some of the highest standing in the profession, were very emphatically of opinion that the innovation was a regrettable mistake; the reservation of the gallery and the serried ranks of chairs in the central hall restricted the space available for friendly converse, and those who had hoped to meet many of their old comrades were sorely disappointed; moreover, the monopoly of the seating accommodation in the hall and gallery for the benefit of members of Council and their guests—"admission by ticket only"!—was keenly resented in some quarters. It was held that no special privileges were justified: that all members, on or off the Council, should meet on a common footing, and every opportunity should be given to carry out the main purpose of this popular reunion. When the Council has learnt the trend of feeling in the matter, we think that surprise packets of this kind will be future be tabooed.

Co-operation, Quality, and Selling Prices.

THE Manchester City Council last week discussed the subject of approved contractors and ultimately referred its list of names back to the Central Purchasing Committee. The discussion arose out of cement, but it turned at one stage on to electric lamps in which the Committee has recently had an experience which brings it into sympathy with the protest of the London County Council recorded in our last issue and referred to again in our "Correspondence" section to-day. According to the *Manchester Guardian* report, Councillor Poole said that the objects of the Central Purchasing Committee were defeated by price rings. He remarked that recently, as the result of an advertisement for 70,000 electric lamps, nine firms tendered at a total cost of £10,000, and there were 270 items without one penny variation. Mr. Poole is credited with the further criticism that there was, in fact, no private enterprise in the electric lamp industry, but the letter in our "Correspondence" columns hardly seems to support that view. Another point of criticism was that when the Committee tried to buy direct from manufacturers it was told in effect that it must buy from one of the twelve agents in Manchester and distribute the order among them so that each might get his 25 per cent. commission.

One by one the different sections of the industry where manufacturers are maintaining their position by co-operative undertakings and action, are coming under the fire of criticism, but if there is anything upon which the critics are silent it is the important matter of quality. Whether it be among cable-makers, lamp-makers, or other departments in which co-operation prevails more or less successfully, the improved research facilities, the more efficient methods of production, and other advantages that organisation has brought to pass, have enabled our manufacturers to turn out an article of such a quality as to secure a very high prestige for British industry. The life of the British-made electric lamp was never so long as now, and the amount of capital locked up in stocks held in all parts of the country is understood all the time to exceed £4,000,000. Quality must be maintained and the industry must be assured of a reasonable profit, but without causing suspicion and resentment amongst purchasers. This point manufacturers will do well not to overlook. At the recent electrical conferences, and on many previous occasions, emphasis has been laid upon the need for cheapening the installation and apparatus costs to the public in order to accelerate the progress of domestic development. There is a widespread sympathy with this view inside the industry. In the speeches at two cable-making company meetings last week reference was made to more economical production and cheaper selling prices ensuing from the closer co-operation that was now taking place. Nobody will deny, to-day, the advantages that have attended the reasonable working of co-operative arrangements considered from the standpoint of particular sections. It may be that we have still to find new ways for ensuring that in the future all sections of the industry, and the public as well, shall benefit and with the minimum of friction.

The Lighting of Textile Mills.

A consideration of the difficulties of the electrical engineer in facing the problem of mill lighting, and some suggestions for their solution.

By J. GUTHRIE OLIVER.

IT is an undoubted fact that the correct lighting of our industrial establishments in this country is a field of study which has not engaged the attention of electrical engineers to the extent that, for example, has the lighting of private houses, offices and public buildings. Nevertheless, competent authorities have from time to time dealt with the problem in lectures and otherwise, and whilst the printed material on the subject emanates largely from the United States, there is no reason to deal at great length with the fundamentals of industrial lighting. In this article an attempt is made to deal with that section of industrial lighting classified as textile, and more particularly the cotton-trade requirements. Here we have an industry centred around South-East and North-East Lancashire, an industry which, whilst being the most important exporting one of the Empire, has been subjected during the last few years to an unparalleled depression. From the commercial standpoint, it is necessary for the electrical engineer to appreciate the extent of this depression and its possibilities of clearing, as this will be the first trouble he will meet when approaching the question of improved lighting. The cotton industry is the most direct product of the industrial revolution. On account of the climate of this country, the abolition of the corn laws and the establishment of free trade, together with the accumulated wealth within the country, the industry flourished to an extraordinary degree. It was possible, and indeed quite usual, for large amounts of money to be made by men who had scarcely ever been beyond the boundaries of their native county, men who were lacking in education and who relied for information of the foreign markets on merchants who had little interest in the actual mill work. During the 19th century, these gentlemen continued to prosper as the world was continually being opened up and further markets developed. Competition, however, was inevitable, and as the standard of living desired by the operatives very properly became higher, larger wages were demanded. The climax came with the war, when other nations, such as India and Japan, began to spin and weave their own cotton on a gigantic scale. To-day Japan actually consumes more cotton than this country. Indeed, it is in Japan that the most startling developments have taken place. It is unnecessary to deal with the many reasons for the competition, but it will be appreciated that these countries are now facing the industrial revolution which our country passed almost a hundred years ago. As a result, wages are low, just as they were in Britain in the early days of the cotton trade, and it becomes an exceedingly difficult matter for this country to compete. Slowly, however, the nations of the world will demand a higher standard of living and of working conditions; even now there are signs in Japan of a general improvement in mill conditions, an improvement which will result sooner or later in the mills of the world being placed on a more or less standard financial basis. The electrical engineer, then, who faces this problem of cotton-mill lighting cannot come to Lancashire in any dictatorial manner. He must realise that here is an industry which has suffered and is suffering from foreign competition in an extreme manner. It is useless merely to state that by a small capital expenditure on lighting such and such results will be attained. He must be prepared to use every argument

Fig. 1.—A Badly Lighted Mill.

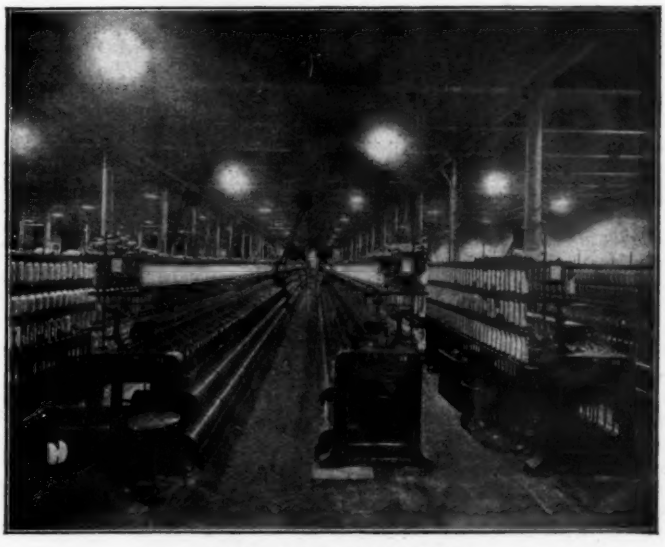


Fig. 2.—A Correctly Lighted Mill.

possible, and to use it sympathetically. Unless he can place himself in the mill-manager's position, he must inevitably fail.

The chief requirements are improved lighting at the very minimum of cost, and it is possible that no great work will be done amongst the mass of mills until some form of extended credit or even hire-purchase of fittings is arranged. The main line of argument must be the increased production which can be obtained by better lighting, and before this can be effective there will require to be very much more concrete evidence obtainable. We have had many tests made as to the results obtained by better lighting in textile mills, but the subject has not been tackled as it will have to be, and as such important matters as shop and domestic lighting have already been. It is certain that the total increase in consumption of power will be considerable, but it is *better*, rather than increased, lighting which is required. Briefly, we have at present mill after mill lighted with ordinary unprotected gasfilled lamps, without any adequate reflectors and representing to a nicety the psychology of the market to be dealt with. The gasfilled lamp represented to the mill owner more light without appreciable further cost, and so it was universally installed regardless of the fact that the change from ordinary-filament to gasfilled lamps constituted a revolution in lighting equal to or greater than the jump from gas to electricity. Doubtless there are many cases where the old gas brackets have been fitted with carbon lamps and then the gasfilled lamp has been substituted with no regard to the art of lighting. Above all things, the engineer must approach the matter in a sympathetic spirit. He is dealing with people, many of whom regard light as so much per kilowatt, and as long as it is light, there is an end of it. Many know virtually nothing of the scientific usage of light, and the engineer must appreciate this factor. Slowly the fact that lighting is a subject worthy of the deepest study is being brought to their notice, but as yet progress is not great. The lighting expert must, therefore, go slowly. He will need to utilise every ounce of his powder, and should dwell on the following points:—

(1) *Increased Production.*—In the widest sense this may be put at 15 per cent. for an increased cost in fittings, etc., of 2 per cent. on the pay roll. He will very promptly be met with the argument that as short time is being worked, increased production is not a matter of vital interest. Those readers who may have thought that too much space was occupied in dealing with the trading difficulties of the cotton trade will now appreciate the position of the electrical expert and the necessity of patience. He is confronted with a situation which is almost unique, and must often leave that mill for another, perhaps in the fine count area where trading conditions are better, or perhaps he will get to the weaving centres where a big Indian buying movement has suddenly put almost every loom into operation on full time, and he will find that there is actual danger of a shortage of weavers. Here then is the opportunity. There is a very real danger of a shortage of skilled operatives in Lancashire due to various causes, amongst which the poor state of trade in the last few years is dominant. Wherever this scarcity shows itself, there is the most fruitful ground for the electrical engineer, as every yard of cloth which can be got out makes room for more, and time becomes money. Here he may dwell on the breakages which occur and the time taken in mending in an inferior light, and, jointly with the power-machinery engineer who is stressing the importance of the individual loom drive, he may point out the length of time the looms are stopped when these breakages do occur.

(2) *Health.*—In dealing with the mill proprietor who cares for his operatives apart from the amount of their output in a given time, the health appeal will be an easy one if finance permits. From any other kind of employer there is little to be expected, however much the claims of health are stressed. Emphasis may, however, be laid on the fact that the loss occasioned by ill-health is enormous, and that the training of another operative to take the place of one who is indisposed always results in loss of output. How does lighting affect health? It is a slow effect, and one therefore which is often disregarded. Each time, however, the operative strains his eyes in a glaring light, with deep shadows in places, he is putting a strain on the nervous system, as it is the brain which sees rather than the eye itself. The resultant headache, so usual amongst females who form such a large part of the total number of mill operatives, results in lassitude and defects of optical vision, which mean further loss of output. Again, a poor light usually results in a dirty and untidy workshop, and it is also a potent factor in the development of tuberculosis, the bacilli of which hate the light more than the wind.

(3) *Accidents.*—Accidents in textile factories are happily not large, and only a small proportion may be directly attributed to bad lighting. Nevertheless, the minor falls which occur and the occasional errors of judgment caused by contrasts of light and shade from the direct illumination of the gasfilled lamp are potent arguments in our favour.

(4) *General Results.*—Better lighting results in an immediate easing of work for the operative, and he or she is not slow to notice that in the mill office or in the manager's room there may often be the latest type of reflector giving a soft diffused light. The noise created in the average weaving shed by the constant thud of the machinery may, and does often, become a matter of little moment, but there is no need to add to the nerve-racking noise the tortures of working in an utterly incorrect light. A happier operative means a more loyal one, and in times of stress this is no unimportant asset. The bad lighting of some mills of the class which are still gas lighted—and they are many—was the subject some time ago of a remark in the *Cotton Factory Times*. The writer described the work of the jaded weaver who attempted to sley tinted ends into a reed as a game of "textile fishing" or mere chance.

Having dealt in brief form with the difficulties which the electrical expert will have to meet and with the main arguments which he may use in endeavouring to pursuade his client of the advantages of better lighting, we will equally briefly deal with the requirements in regard to light. It will be understood that definite standards are exceedingly difficult to lay down, and considerable variation is required. It will be noted that in all weaving sheds, single-storey buildings are employed, and there are roof lights usually facing north. The proprietors therefore appreciate the first elements of the necessity for good lighting without either heavy shadows or great heat. Actually, however, as a result of an investigation carried out by the Medical Research Council, it was found that only from 0.2 per cent. to 5 per cent. of the actual daylight was found at the loom. It will be apparent, therefore, for what a considerable period artificial light must be resorted to; it was also found by the Council that with suitable arrangements, artificial lighting need not necessarily be inferior to natural. In the weaving sheds seen by the investigators, the sources of artificial light were a little over six feet above floor level, and in no case did the reflector on the light obscure more than two-thirds of the globe when the eye was placed on the same level as the lower rim of the reflector. In most cases, therefore, about half the bulb could be seen by the operatives. If the weaver is looking down at the cloth on the loom, then light from the lamps does not strike the eye directly, but otherwise she is exposed to this light. Throughout the whole period of artificial illumination, therefore, the eyes are exposed to light striking obliquely, and, as this report rightly emphasises, the true importance of this, as in the case of noise, is not realised until the defect is removed. Shadows, especially perhaps those caused by belting and, therefore, of a flickering nature, are another serious cause of trouble, and the makers of individual motors may once again join hands with the lighting expert in getting them removed. Reflectors of the correct type are the only solution to these problems,

and here the recommendation of the Lighting Committee is that every bright light source within a distance of 100 feet from any person employed shall be so shaded from the person that no part of the filament is distinguishable through the shade, unless it be so placed that the angle between the line from the eye to an unshaded part of the source and a horizontal plane is not less than 20 degrees, or in case of any person employed at a distance of six feet or less from the source, not less than 30 degrees.

The actual light required is classified by American textile lighting experts into three schemes: 1, for rough work with no discernment of detail; 2, work requiring observation of machine operation; and 3, work requiring discrimination of detail. Under 1, a general illumination of two and a half foot-candles is required; under 2, five foot-candles; and under 3, eight foot-candles. On a basis of 100-watt units and in cases where, as under 3, discrimination of detail is required, a spacing of 8 feet where the ceiling is under 12 feet high is recommended. Where the ceiling is from 12 to 16 feet, the recommendation is for a spacing of 10 feet with minimum units of 150 watts. Where ceilings are above 16 feet, 200 watt units are required with 13 feet spacings.

The illustrations, figs. 1 and 2, show as well as is possible the wide difference which exists between a badly lighted and a correctly lighted mill. The variation in requirements, and perhaps above all the cost of the installations are factors of such supreme importance that it is scarcely likely to serve any useful purpose if extensive details are given, reference being merely made as above to the broad outlines of the requirements of the mill.

Kiosk-Type Sub-stations.

Some present-day requirements and constructional details, with particular reference to apparatus produced by Messrs. Johnson & Phillips, Ltd.

By H. F. YELLAND.

IT is not difficult to account for the success of the kiosk-type sub-station, the development of which can be attributed, on the whole, to rural and urban electrification schemes necessitating low initial costs and flexibility for future requirements.

On all sides there is abundant evidence of the rapid propagation of kiosk sub-stations, and manufacturers report a great increase in the number of orders executed and inquiries received for this class of gear. There is no doubt as to the popularity of this type of sub-station

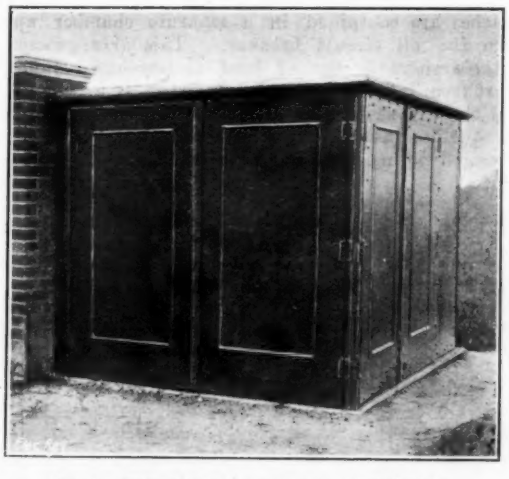


Fig. 1.—External View of a J. & P. All-steel Kiosk.

with supply engineers who are confronted with the problem of extending supply areas on the borders of growing towns, or who have to consider supplying outlying villages or factories at the lowest possible initial cost. Where the expected load is at a considerable distance from an existing supply source, the cheapest solution of the problem is usually found in laying a h.p. main, or constructing an overhead line, and supplying medium or low-pressure consumers through a step-down transformer situated at or near the load centre. This necessitates the use of some form of sub-station at that point, and where low cost is the deciding factor, there is no cheap alternative to the kiosk.

Hitherto, the principal cost in the construction of even the smallest type of brickwork or concrete sub-station has been the building itself, the cost of which has often outweighed the value of apparatus housed. High building charges are to a large extent the outcome of building in places remote from towns, but this drawback can be overcome by building the sub-station as a complete unit in a workshop, and transporting it to the site. This may sound revolutionary, but the requirements as to portability and dispensation with brickwork are met by the all-metal kiosk, which is the type now in great demand. The all-metal kiosk may take several forms, the first of which we are all familiar with. It is a larger edition of the street pillar, and consists of a cast-iron frame carrying massive doors supported on large and highly ornamental hinges. For reasons best known to the designers, a large amount of ornamentation is considered essential, but the modern engineer following present-day tendencies prefers a bold design without too many flourishes.

A second type of kiosk, and incidentally the cheapest available, consists of a framework of angle- and flat-iron, with doors and sides of sheet-steel plate. Malleable-iron or gunmetal hinges are usually fitted, and these as a rule provide the only ornamentation to relieve the severity of the structure. The general appearance of the doors and sides may be enhanced by a simple framing of half-round wrought-iron, mitred at the corners and riveted to the sheets for stiffening purposes. The sheet-steel roof can be nicely finished by boldly rounding off the edge, and turning it slightly underneath. The corners of a kiosk of this type usually present the greatest difficulty, and although the angle-iron framework may be left exposed, it detracts slightly from the general appearance. A slight modification is to use rolled-section or pipework corner pieces; the resulting structure is not displeasing to the eye, and is cheap to manufacture. Such a kiosk is illustrated in fig. 1, an external view with all the doors closed, and fig. 2, an internal view of the same kiosk.

The third type consists essentially of a cast-iron skeleton framework to which is attached flat sheet-steel covers and doors, the latter being relieved by ornamental cast hinges and locks. The roof, which is of welded steel, is carried on a cast moulding, pleasing in appearance and not costly to manufacture. This kiosk combines the good points of the first and second types, the resultant cost being midway between the two, and in general it may be said that it is the type least likely to offend the artistic sensibilities of our all too numerous critics.

The general requirements of the kiosk sub-station necessitate the use of e.h.p. switchgear for the incoming mains, and m.p. or l.p. switchgear for local distribution. The problem confronting manufacturers is to condense this apparatus into the smallest possible space consistent with reliability and safety in operation. It is advisable in every case to provide some means of automatically disconnecting the power transformer, and to this end an oil circuit breaker is usually provided on the e.h.p. side. Isolating switches are necessary to permit an operator to carry out routine tests on the circuit breaker, and from the economical standpoint, plain knife-type pole-operated isolating switches cannot be improved upon. In many cases kiosk-type sub-stations form part of a ring-main, the e.h.p. cable being looped in and out, and the local transformer tapped off the bus-bars. Here, again, isolating switches are necessary in the ring-main circuits. From the operating standpoint, and also to keep to the spirit of the Home Office Regulations, it is advisable to keep these switches and circuit breakers in separate compartments, and this is generally achieved by a screened-type construction; in fact, the kiosk thus designed may become a cubicle within a cubicle.

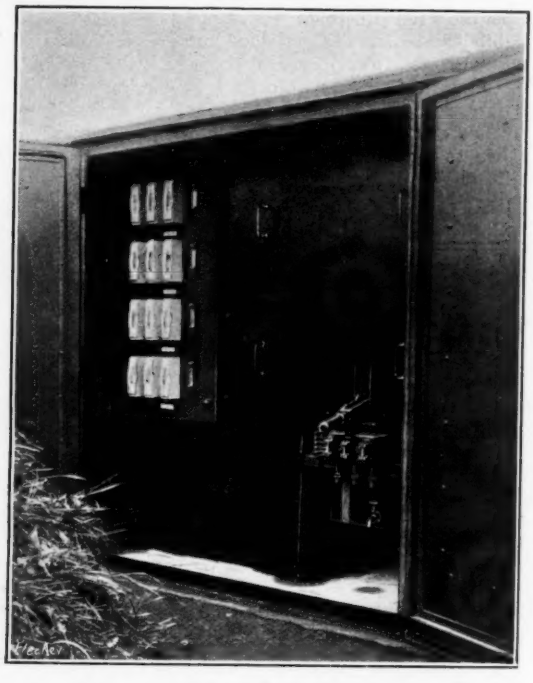


Fig. 2.—Interior View of Kiosk shown in Fig. 1.

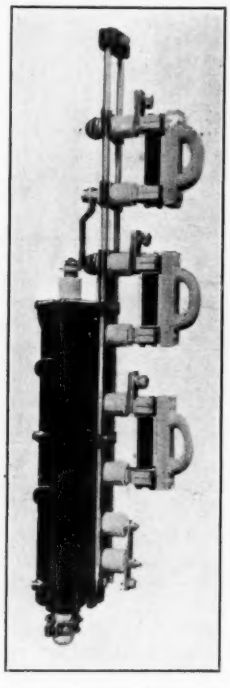


Fig. 3.—J. & P. Cable Unit.

Regarding the l.p. switchgear, this may take several forms, depending upon individual requirements, but the most simple and certainly the neatest arrangement is to adopt standard cable units of the type illustrated in fig. 3. Fuses are mounted on porcelain insulators clamped to a compound-filled dividing box. The top fuse contacts are designed for connection to a bus-bar, and the bottom contacts enter the dividing box at the rear. Phase-dividing barriers are fitted, and each unit is in itself a complete distributor. They are exceedingly compact, and additional units may be added without disturbing those existing. The particular unit illustrated is suitable for a 3-phase 4-wire system, but the apparatus is adaptable for any other system of distribution. In some cases a fifth wire is carried through the box, and a fuse provided for street lighting.

A kiosk equipped with apparatus as described above meets the general approval of supply engineers in this country; fig. 4 shows the lay-out of a sub-station embodying this class of gear. A good feature in the design is the fact that all the switchgear is accessible from one side, and in fact, doors are only required on two sides, the second one giving access to the transformer. Such a kiosk, suitable for connection in an 11-kV ring-main and fitted with a 150-kVA 3-phase transformer and six distributors, can be accommodated on a piece of land 11 ft. by 7 ft. These dimensions allow for opening the compartment doors, it being assumed that the transformer can be withdrawn on to the footpath when necessary. In the past, the failure to acquire a convenient sub-station site has often led finally to erection at an unsuitable point, but when a site so small as 11 ft. by 7 ft. is all that is necessary, bargaining with recalcitrant landlords is reduced to a minimum. Referring again to fig. 2, the equipment necessitates access from three sides, as the ring-main isolating switches are contained in a separate chamber apart from the oil circuit breaker. This arrangement is suitable where a plot of land is purchased standing apart from buildings and obstructions. It will be noted that the l.p. switchgear illustrated consists of standard Home Office fuses mounted on a slate base. This was arranged to meet special requirements, but, as mentioned above, it is more usual to fit cable units or fuses mounted on insulated steel rods.

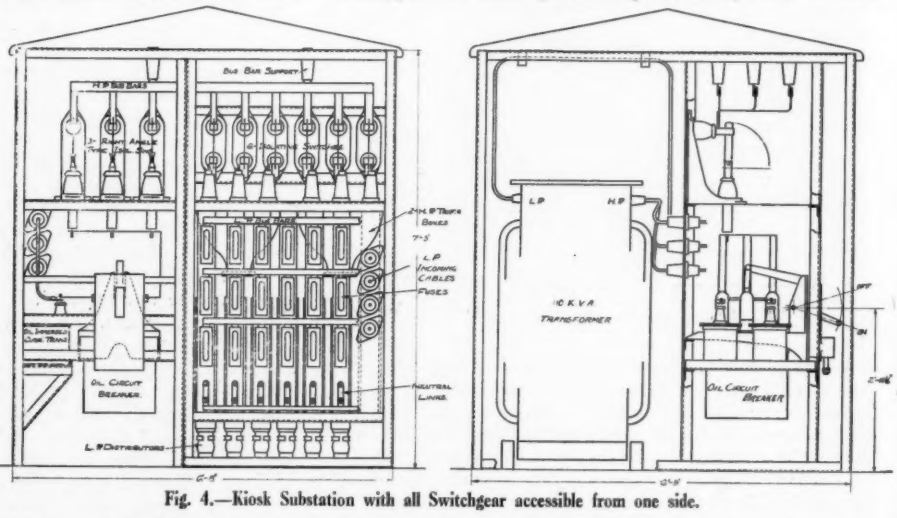


Fig. 4.—Kiosk Substation with all Switchgear accessible from one side.

Nothing has yet been said with regard to transformers for use in kiosks, but as these transformers are practically standardised, they need no discussion here. Oil-immersed self-cooled transformers are advocated, and it is the usual practice to provide adjusting tappings on the e.h.p. side. Rollers may be fitted to facilitate

handling, and the usual refinements added. Attention must be paid to the air space left around transformers. It is not sufficient to allocate just enough space to house the unit; there must be ample ventilation, and in general the cubic capacity of the transformer chamber should be not less than 1.5 times that of the transformer itself in a well-ventilated kiosk. Efficient ventilation is important, and it is advisable to provide some means of producing a continuous draught of air through the transformer chamber. This is best accomplished by providing small louvres near the bottom of the kiosk, and leaving openings beneath the eaves of the roof for the escape of the heated air. This arrangement is quite satisfactory, but the eaves must be arranged to project over the doors by an amount sufficient to prevent the ingress of driving rain, sleet or snow, and the louvres wired to prevent the entrance of vermin.

It will be realised that this article does not by any means cover the whole field of possibilities in kiosk design. Many alternatives to the "cubicle-within-a-cubicle" construction can be put forward, and in fact armourclad switchgear is sometimes installed, although this is more expensive; as the primary object of kiosk construction is low initial cost, this is to some extent offset by the extra expense involved. Ironclad l.p. switch and fuse gear is often fitted, this being also a more expensive construction than cable-unit distributors, but there is the added advantage of speedy disconnection by hand of any one circuit. A cheap alternative to an oil circuit breaker for transformer protection is the use of tetrachloride fuses, although it is possible that these, on opening a short circuit in a restricted space, as in a kiosk, may not function as well as if they were in more congenial surroundings.

There are one or two points in kiosk design not always given the attention they deserve. First, with regard to illumination: it is realised that kiosks may not be illuminated as ordinary sub-stations, principally on account of restricted height and compact design, but it is a simple matter to provide a switch and plug in each chamber, and to keep a portable lamp within. Another point often overlooked concerns the design of that weakest link in the e.h.p. system—the current transformer. In an endeavour to tender the lowest possible price, manufacturers are prone to offer poorly constructed air-cooled current transformers regardless of the prevalence of moisture. Oil-cooled transformers inspire greater confidence, and are, after all, very little dearer than air-cooled transformers. The prevalence of moisture is also a factor which has influenced designers and caused them to abandon slate panels in favour of cable units or fuses on insulated steel rods for the l.p. distributors.

The utility of interlocks is somewhat problematic; given intelligent operators, they are hardly necessary, and they certainly add to the initial cost. Moreover, given a ring-main kiosk, with what would one interlock the ring-main isolators? And if interlocks are dispensed with here, are they necessary on single-line feeders or on the transformer circuit?

In conclusion, some more advantages of the kiosk-type sub-station may be pointed out. One obvious advantage is the rapidity with which erection can be carried out, and another the fact that the contract for a complete sub-station can be placed in the hands of one firm manufacturing both switchgear and transformers. From the point of the supply engineer, this saves reams of correspondence with several manufacturers and between contractors themselves, not to mention delays which occur while drawings pass from one contractor to another. It has already been pointed out that low initial cost and space economy are important factors tending to popularise this type of sub-station; an additional advantage may be pointed out in conclusion, and that is the fact that an average 200-kVA sub-station of this type, making a moderate load for a 3-ton lorry, is portable and can be easily transferred from one site to another.

The Basis of Success in Retail Electrical Trading.

By LEONARD DONALDSON.

ALTHOUGH the science of production has been studied and practised by progressive executives for decades, it is only within recent years that serious attention has been paid to the "scientific management" of the retail side of modern business. There is science in selling to just as great an extent as is to be found in any other phase of industry. In America, for example, Taylor and Gilbreth both gave many years of their valuable lives to the standardisation of scientific selling principles, and proved, moreover, that only by the observance of such principles could the basis of real success in retail trading be laid.

Accounting and Stock-Handling Systems.

It is, perhaps, in the handling of stock, and in retail accounting systems, that the introduction of scientific methods has become most marked in recent years, although many traders still regard these matters as necessary evils. The average man troubles little beyond matters of expenditure and receipts. Cost accounting enters little into his calculations.

A trader's accounting system indicates to a great extent the efficiency of the management methods he employs. Systematised accounting will show the conditions in detail of the business, say, either monthly or quarterly. Accounting carried out under scientific management methods shows the profits and losses of the concern for the year by thirteen periods of four weeks each, instead of twelve monthly periods, and at the expiration of each of these periods a detailed analysis of the position can be readily made.

There is no necessity to introduce a complicated accounting system. The average small trader has no time for that. The shopkeeper should be able to ascertain at any time how the business stands financially; the value of stock in hand; the amount of outstanding accounts; accruing expenses, such as rent, rates, lighting and heating, and all other small items included in "overhead costs."

System in the Storeroom.

Efficient storekeeping is an equally important factor in scientific shop management. The lay-out of the storeroom should be such as to involve a minimum loss of time in finding the component or special articles required at the counter. The shop shelves should be regularly replenished from the store-room stock. Each shelf should be numbered or lettered, the shop-shelf markings corresponding with those in

the storeroom. Space should also be left to accommodate temporarily the new goods arriving from manufacturers until they are transferred to the shelves

Use of Coloured Cards.

It is an excellent plan to employ a number of coloured cards for the purpose of indicating the quantity of stock in hand. These should be affixed with a drawing pin to each pigeon hole in this way:—

(1) *Red* indicates no reserve stock in hand.

(2) *Green* shows reserve stock in the storeroom. (The quantity should be marked on the card, together with the name of the supplier.)

(3) *White* indicates that the stock is getting low, and that fresh supplies should be ordered without delay.

This method is capable of extension as desired, but the average electrical trader will find the example given sufficient for all ordinary purposes. Where goods are displayed on the counter, or anywhere else than upon the shelves, they should also be ticketed in a similar way, the card bearing the number of the stock room shelf and the colour indicating the position of the reserve stock. Not only will this system prove a great time saver when serving customers—it will also be found of great assistance in facilitating the work of stock-taking.

Electric Signs.

Some Cases of Interest.

By W. ERIC JACKSON, LL.B., Barrister-at-Law.

THE electric sign, as a means of advertisement, has not only come to stay, it is a growing influence in the world of advertising. It is therefore not surprising that from time to time, like all new things, it should clash with the law when its increasing popularity causes it to extend beyond what might be considered its due place in the scheme of things. The cases at law dealing with advertisement signs are few but of peculiar interest. They may be divided into two classes: first, where the landlord of premises complains that the tenant in putting up advertisements is damaging the property and breaking the covenants in the lease; and secondly, where tenants of adjoining premises complain of nuisance and annoyance from the advertisement signs.

A typical case of the first class was decided in 1925, when the London County Council, the landlord of a building in Piccadilly Circus, sued the tenants for installing an electric sign on the wall of the building. The tenants' lease contained a covenant against cutting or maiming the walls, altering the architectural design, or damaging the premises. The tenants let off the outer wall of the premises to an advertisement contractor, who fixed to the wall a flashing sign concerning a well-known brand of gin. This sign had nothing to do with the tenants' business; they merely received a payment for its display. The sign was fixed on an iron framework, which necessitated the cutting of several holes in the stonework. The Court held that the fixing of the sign was a breach of covenant as regarded cutting the walls and damaging the premises. The existence of the sign itself, without such damage, would not have been a breach, nor an alteration of the architectural design; but an injunction was granted, and the sign had to be removed.

It has long been an established rule of law that the lease of premises includes the outer walls of the rooms involved. Hence a tenant can always use his outer walls for any purpose subsidiary to his business, so long as he does not commit a breach of covenant. It is quite permissible for an occupier to let off his outer walls to advertisement contractors so long as the terms of the lease are obeyed. Some leases forbid the use of premises for business purposes. In such a case the mere placing of a notice "Coal office orders taken here" has been held to be a breach of the lease. It is therefore advisable, when contemplating the fitting of signs, to see the lease in question and to read it carefully; for the slightest technicality may cause an injunction to be granted against the person erecting the sign.

A common clause in many leases forbids tenants to do any act which may cause annoyance. In this connection it has been held that an advertisement hoarding is a "noisy, noisome, offensive or dangerous trade or calling." A great deal seems to depend on the building involved and the class of property in the neighbourhood.

Side by side with the landlords' right to complain of nuisance and annoyance exists the legal right of any person who suffers from the alleged nuisance to bring an action for an injunction. Such actions have often been brought as a means of stifling a rival's trade. The two types of case may very conveniently be dealt with together, the only difference being that in one type it is the landlord who complains; in the other it is outside parties. But unless some nuisance exists, the complaints will not succeed at law.

In North London, about fifty years ago, an enterprising clothing store erected an enormous and striking advertisement across the whole frontage of its premises. It was described as "big, ugly, obtrusive, and vulgar," but this, of course, was in the days when advertising had not reached its present state. The landlord sued on the ground of nuisance, but no one from the neighbourhood came to Court to complain of nuisance except the landlord. The Court gave judgment for the advertiser, stating that in a business neighbourhood it was only to be expected that business houses should put up advertisements.

But it is otherwise in quiet residential areas. In 1909 the Chancery Court granted an injunction against an advertiser who had plastered with bills the whole side of a house adjoining a country parish church. The advertising was, in fact, no more glaring than the hoarding in North London, but its position and the neighbourhood rendered it much more offensive.

In America, where advertising is more intensively practised than in this country, attempts have been made to attack advertisements on the grounds that their glaring and brilliant effect cancels the appeal of adjoining advertisements. So far the principle has been upheld both here and in America that a man may do what he likes on his own property so long as he does not damage the property and trade of others, and even if he does injure other persons' trade, this is no ground for attacking him, so long as he acts ordinarily within the necessary and reasonable limits of his business and is not malicious.

The case of a jeweller, decided in England, has a bearing on this. A dealer in cheap and imitation jewellery, like most of his trade, kept his electric light on at full glare all day, and to intensify the glare he kept his shop blind drawn out all day long as well, to act as a reflector and heighten the glitter on the wares in his window.

The tenants of the premises above complained that this practice prevented passers-by from seeing the tablets and signs hung out from their upstairs windows. The Court of Appeal turned a deaf ear to their complaint. No direct or malicious act of injury had been done by the jeweller. He had merely used to the full the opportunities afforded by his premises within the reasonable scope of his trade.

The principle seems thereby established that if, in the course of your advertising, you are so ingenious as to devise brilliant and striking displays which put everyone else's displays in the shade, you are quite within your rights. The same applies to newspaper space. You can do what you like within your space so long as you do not libel or attack other traders. There may come a time when public authorities will prescribe advertising by-laws, as they have done for housing and the building line; but that time is not yet.

Rural Electric Lines.—I.

A symposium of the opinions of electrical engineers experienced in the construction of overhead lines in rural areas, with examples of methods that have been, or are to be, adopted for the distribution of electricity at low and medium pressures.

INVITATIONS to comment generally on ways and means of simplifying the regulations relating to overhead lines, and methods of cheapening the construction of aerial distribution systems, with a view to facilitating the more extended development of rural electricity supply, have been responded to by engineers of diverse interests with an alacrity which bears witness to the importance of the subject.

The author of the following article, the first of a series, has had a good deal of experience in the design of extra-high-pressure lines of above 50,000 volts (see *Journal*, I.E.E., Vol. 46, Part 207, 1911: "Extra-High-Pressure Transmission Lines"). He has also, as a central-station engineer, had charge of the low-pressure overhead distribution system in an American city. In the latter case there were 4,000-volt series arc lamp and 2,300-V main distributor overhead lines, in addition to the 110-V consumers' supply. Further, he has had special opportunities for studying overhead-line construction in many parts of the Continent and in Great Britain, being also the owner of an all-electric farm.

An Engineer-Farmer's Views.

By R. BORLASE MATTHEWS, Wh.Ex., A.M.Inst.C.E., M.I.E.E., F.R.Ae.S.

I hold what may be considered the somewhat heretical point of view that the overhead line is but the forerunner of the cable. It is a means to an end. When the supply to a district has reached what, in the light of our present knowledge, may be termed the saturation point, consideration may be given to the substitution of cables for a certain portion of the overhead lines. There is nothing novel in this idea; after all, it is but the practice of the Post Office Telephones Department. If this view is held, however, it means that the basis of the design of overhead lines should not be one suitable for all time. I will confine my comments to sub-distribution overhead lines of 11,000 down to 1,100 volts and the consumers' distributors at about 400/230 volts, three-phase.

British engineers have had more experience of, and are more expert at, laying cables than almost any other engineers in the world. This, however, makes them ignore the fact that a great deal of experience is necessary in overhead line construction. It seems simple, but it is not so simple as it looks. British electrical engineers grumble at severe official regulations, but who made them? Why, their own representatives. Proposed modifications of the Low-Pressure Regulations are at present under consideration. I venture to predict that they also will be considered very restrictive in a few years' time. The British engineer in conference seems to overlook that special feature of his profession, the economic side. The slogan of "safety first" must always be rigidly held in view, but, as perfection is unattainable, it is of no use trying to fully achieve it, regardless of common sense. "Safety first" for overhead electric lines should be on a par with the standard of other public utilities. If motor-cars are not stopped from rushing along unprotected roads at the speed of express trains, it is absurd to carry the safety of overhead-line construction to an extreme. A far wiser step is to educate the public. In the Netherlands the Association of Central Station Managers has started an electrical educative campaign among the school children, which includes apparatus, diagrams and text books. A few years ago they commenced at the wrong end of the stick—by instilling ideas as to the danger of electricity (which was graphically shown as a red devil with a trident behind the scenes inside the electric conductor ready to impale the wrongdoer). Now they teach children the first principles of *modern* electricity, and so by giving them a clear understanding, enable them to avoid danger, because they appreciate the reason why. This is an illustration of the fact that there are more ways than one of ensuring the safety of the public.

I do not know that I consider the present regulations too severe for those engineers who are unaccustomed to overhead-line construction. It is just as well that amateurs should work to an extra-high standard. An engineer who is accustomed to overhead-line construction knows the practical limitations, and any scheme he submitted would be carefully considered by the authorities. By the way, even the existing regulations are not as the law of the Medes and Persians. There are permissive clauses which can be applied to responsible parties.

To cheapen the cost of rural distribution, particular attention must be paid to the problem of lay-out. A large percentage of the price at which electricity is sold to the consumer is solely the result of the transmission charges, for British generating costs compete with the world's best.

Capital outlay is a necessity and should be faced with a sure confidence that such outlay will be justified by the return obtained. At the same time, extravagance can be guarded against. This obviously calls for the education of the public in the uses of electricity, for the bigger the demand per route mile of distribution, the less the cost per consumer.

The present cost in this country of three-phase, low-pressure overhead lines is in the neighbourhood of from £500 to £800 per mile, although the writer has put up similar lines on private land for about £200 per mile, and even this is double the amount spent on the same work in certain Continental countries. The enormous difference is largely accounted for by the stringent regulations which have to be observed under the present system, coupled with a certain lack of experience and the idea that the lines are erected to last a very long time.

Points which would effect a substantial reduction in cost are the following:—(1) Construction work on poles is too frequently done by the roadside instead of in the factory. The poles should be of circular or polyhedral cross section, with circular pole caps, as much time can be saved if the poles have not to be aligned to match the lie of the conductors. The design of the insulators and any cross arms used should permit of their being clamped on the pole tops without any special drilling. (2) The tapping of extra-high-pressure lines must be reduced in cost. The main requirement of a cheap tapping transformer point is a simple method of breaking the circuit without involving any risk of surges, or causing a persistent arc across the break. This can be done by employing isolating links with horns, operated by mechanical gear, or by an earthed insulated rod; the high-pressure line must also be protected from faults that may occur beyond the tapping points. Tapping should only be done at economic points on the network. (3) Longer life is assured to wooden poles if they are fitted with special pole footings which hold the pole above the level of the ground, or in the case of existing poles they can be used for replacing the rotted parts. (The latter is

the more economical use of this system.) They usually consist of simple concrete or ferro-concrete or steel channel footings, which support the pole about six to 12 inches above the level of the ground. Where armoured concrete poles are used, a quick method of manufacture is to use rapid-setting cement which enables the same moulds to be used over and over again without delay. The bases of the concrete poles are sometimes cast round, so that the pole can be dropped into a socket and wedged and grouted, a task occupying only a few minutes. Hinged concrete posts are easier to transport and easier to erect. Alternatively, herring-bone brackets of galvanised steel can be used; these enable the phases to be easily transposed, thus neutralising any inductive effect on neighbouring telegraph or telephone lines. This transposing of the phases has been used by Mr. F. H. Clough as a safety device, as, if each wire is only fixed at each third pole, should it fall at any time, it will short-circuit on a wire underneath. (4) Where current consumption is low, galvanised steel overhead wires are quite acceptable. (5) More electric power should be used in constructing pole lines, also more of other mechanical aids, such as ploughs and borers. There is too much navvying work to-day. (6) Let some of the prospective consumers do some of the construction work (under supervision, of course). (7) Reduce the height of the poles so that the lines are the same height above the ground as bridges.

Then there is the vital question of wayleaves. About the worst job in this country of vested interests is that of soliciting wayleaves. Here, again, intensive publicity is needed. It is not everyone that realises that one shilling a year rental for a ten-inch diameter pole represents about one thousand pounds per acre for land normally worth twenty-five to forty shillings per acre. A lot depends upon how things are put. In parts of Germany a public inquiry is held as to the advantages or otherwise to the community of a new line. The landlord is allowed to appeal, *but* any increase in the value of his land due to the existence of the line is then considered, and if there is such an increase, his assessment for rates is correspondingly increased. (German landlords now find it wiser not to appeal.)

One of the best methods of reducing the costs of overhead line construction in this country would, in my opinion, be to greatly increase the funds available for the British Electrical Development Association, for most of the troubles can be traced back to a lack of electrical education on the part of the public.

Legal.

I.R.G.P. & T. Works Co., Ltd., v. Western Union Telegraph Co.

IN the King's Bench Division on July 5th, Mr. Justice Bateson, sitting without a jury, had before him an action brought by the India Rubber, Gutta Percha and Telegraph Works Co., Ltd., against the Western Union Telegraph Co., to recover £3,354 balance of hire of the cable ship *Silvergray*. The defendant company, in denying liability, pleaded that the contract was not carried through with efficiency, and they counterclaimed for damages.

The onus being on the defendants, Mr. LANGTON, K.C., opened the case for them. He said that plaintiffs' contract with the defendants was to repair the Atlantic cable and the defendants' case was that the work was done so negligently that they were put to unnecessary expense. They chartered the plaintiffs' vessel to do the work of repairing the cable at £260 a day. In 1925 the cable developed a fault about 330 miles west of Penzance. The Western Union not having a cable ship available, chartered the plaintiffs' ship *Silvergray* on an express condition that the ship was sound and seaworthy and in all respects suitable for the work to be undertaken, well equipped, and provided with competent and skilful engineering and electrical staffs. That agreement was made orally by Mr. S. J. Goddard, on behalf of the Western Union, and Mr. Gray, a director of the plaintiff company. The charter commenced to run on February 4th, 1925, and terminated on March 20th, 1925. The breaches of agreement now alleged were that the ship was not seaworthy or efficiently equipped, and hence they pleaded set-off and counterclaimed for damages.

Upon the resumption of the case on July 6th evidence was given by Mr. S. J. Goddard, vice-president of the Western Union Co. and controller of the company's European cable business. He said that his company had previously had similar dealings with the plaintiffs. At an interview in February last year with Mr. Gray, managing director of the plaintiff company, he asked for an assurance that the ship which would be employed and her crew and equipment were competent to carry out the repair, and an assurance was given by Mr. Gray. He was introduced to Capt. Robinson, who was to take charge of the expedition. The Western Union Co. arranged for a representative to be stationed in the *Silvergray* to render reports regarding the progress of the work.

Mr. JAMES DAVIDSON, the representative referred to, was called to give evidence as to his reports, and in cross-examination he explained that he was up all one night in order to record failures in the working of the ship's machinery.

Capt. VINCENT F. SPARKS, a retired commander of the Eastern Telegraph Company's service, gave technical evidence regarding the equipment of cable-repair ships, and the hearing was again adjourned.

Parliamentary News.

[By Our Special Parliamentary Reporter.]

Municipalities and Foreign Cables.

In the House of Commons Mr. DAY asked if information had been received of any municipalities that had decided to purchase high-pressure cable from abroad during the next 12 months.

Colonel ASHLEY said that neither the Ministry of Transport nor the Electricity Commissioners had received any such information.

The Central Electricity Board.

On July 7th, Mr. HARDIE asked the Minister of Transport if his attention had been called to the acceptance by a member of the Electricity Board of a directorship in a company whose interests and profits were dependent upon such schemes as the electricity scheme; and whether he proposed to take any steps in the matter.

Colonel ASHLEY said that the conditions under which the members of the Central Electricity Board might be appointed and might act were laid down in Section 1 of the Electricity (Supply) Act, 1926, and he knew of nothing that would warrant intervention on his part in connection with any such case as was referred to.

East Anglian Electricity Bill.

A House of Lords Committee considered this Bill on July 10th and subsequent days. Mr. H. P. McMillan, K.C., appeared for the promoters, the East Anglian Electricity Supply Co., Ltd., and there was opposition by the Corporations of Norwich, Yarmouth, Ipswich and King's Lynn, and Essex County Council. A report of the proceedings will appear in our next issue.

"Exploding Wires."

In an article in a recent issue of the *Scientific American*, Prof. H. N. Russell gives some particulars of "exploding wire" experiments which have been carried out, particularly by Anderson at Mount Wilson, to give some representation of the heat and brilliancy of the sun and stars. Wires of any electrical conductor are drawn or worked out to an extreme fineness and then placed in circuit with a large condenser which may have a potential charge as high as 40,000 V. High-frequency current is applied and the wire is instantly converted into a thin filament of incandescent vapour, evidently at high pressure, which expands in all directions until its diameter reaches about an inch or so and its pressure is reduced to that of the atmosphere. This process takes about 1/25,000th of a second. From the intensity of the light obtained it is estimated that the initial temperature of the gas is fully 20,000 deg. C., as hot as all but a few of the very hottest stars. It is shown that the incandescent vapour at its hottest point is opaque. A bright-line spectrum is given off by a spark gap fed by the same discharge when the spark is in front of the explosion, but the spark is invisible when it is positioned at the back. The observations are made possible by photographing the reflections of the "explosion" from a rapidly revolving mirror.

Business and Industrial Notes.

The Week's Electrical Trade News from all Sources. Commercial and Industrial Developments, Business Changes, Market Prices for Materials, Trade Openings, New Publicity Literature, Liquidations and Failures.

Amalgamation of Well-known Electrical Companies.

In our "City Notes" to-day we give some particulars of the proposed amalgamation of the businesses of MESSRS. CROMPTON AND CO., LTD., and MESSRS. F. & A. PARKINSON, LTD., of Guiseley. More detailed particulars are set forth in the printed circulars issued to the shareholders of Crompton & Co., Ltd., along with the annual report of that company.

Electrical Manufacturing Activity: Export Trade Flourishing.

The orders secured by electrical manufacturers for generating plant and heavy electrical equipment during the twelve months ended June, 1927, constituted a new record in the history of the industry. Information collected by the Economic and Statistical Department of the British Electrical and Allied Manufacturers' Association shows that on a horse-power basis, the total increase over 1920 was 28 per cent. On home account, uncertainty regarding the national situation in electricity supply and severe trade depression caused a decline of 6 per cent. below the 1920 level, but, on export account, the remarkable increase of 134 per cent. took place. In the first six months of this year British firms booked contracts for a higher plant capacity than during the whole of 1924 or 1925.

India, Australia, New Zealand, South Africa, South America, and Japan were the principal markets affected: important railway electrification developments, large water-power and steam super-power schemes and extensive transmission and distribution systems formed the object of valuable contracts, amounting, in several cases, to hundreds of thousands of pounds. In connection with main-line electrification in India, one firm obtained, against the most determined competition, especially from Sweden, an order for rotary-convertor plant valued at more than £250,000. The success of the British firm is peculiarly significant in view of the fact that the Southern Railway Company placed orders with Swedish competitors a short time ago for the same type of plant, and is, in itself, sufficient reply to the accusation of competitive inefficiency then made. In Europe, the British electrical industry is steadily advancing, while, in the Far East, the Straits Settlements, Africa, and Canada it has been able to strengthen its position very markedly during the past year.

It is estimated that over 60 per cent. of all contracts for generating plant in the world, outside of the main industrial countries, and over 70 per cent. of all traction orders, especially in connection with railway electrification, fell to British manufacturers. During the first five months of this year British export shipments, at £7,757,000, showed an increase of 11.5 per cent. over the corresponding period of 1926, a previous record. German exports during the same period showed a decline of 3 per cent., American exports were stationary, French exports fell 24 per cent., while the Swiss position improved by 10 per cent. The result is that now Britain's share of export trade relative to the four other competing countries has increased to 32 per cent. This compares with 23 per cent. recorded in 1913. Britain is now easily the leading export country in the world for electrical goods.

The British Industries Fair.

There are indications that the greatly-increased space available at Castle Bromwich for the Birmingham section of the British Industries Fair will all be booked up much earlier than on any previous occasion. In addition to several new-comers, firms which have not exhibited for four or five years are making a reappearance.

Electric Power in Industry.

In Preliminary Report No. 17, upon the 1924 Census of Production (published with the *Board of Trade Journal* for July 7th), further branches of industry are dealt with. It is shown that in the hat, bonnet and cap-making trades the generating plant installed rose from 289 kW in 1907 to 485 kW in 1924. The aggregate capacity of electric motors installed was 9,668 h.p., power for 8,999 h.p. of which was purchased. The cattle, dog and poultry foods trade reported 496 kW of generating plant (against 75 kW in 1907), and 8,779 h.p. of electric motors (power for 8,173 h.p. purchased). The generating plant of the preserved meat, fish, fruit and vegetables, pickles and sauces trades, amounted to 3,780 kW, and the electric motors to 16,742 h.p. (power for 13,562 h.p. purchased). The installed generating plant of the ice trade was 2,114 kW (against 532 kW in 1907). Motors of an aggregate of 19,912 h.p. were in use, power for 18,317 h.p. of which was purchased.

Registered Electrical Contractors.

At last week's meeting of the Executive Committee of the National Register of Electrical Installation Contractors the following applications for registration were accepted:—

Lowe & Oliver, Oxford.
Jagger Bros., Handsworth, Birmingham.
Robertson, Albert, South Shields.
Etna Lighting and Heating Co., Ltd., Birmingham.
Atherton, W. H., & Co., Hoswall, Cheshire.
Hawker, George S., South Croydon.
Irish & Reeves, Cleethorpes.
Coley & Swinnerton, Ltd., Wolverhampton.
McGinley, F. B., Belfast.
Dale, W. H., Manchester.
Fryer, W. & P., Ballsbridge, Dublin.

At the same meeting five applications were declined, and the names of 19 contractors were struck off the Register for various reasons.

New Catalogues and Lists.

THE RAY ENGINEERING CO., Frogmore Street, Bristol.—An illustrated and priced folder advertising the company's "Type R" battery charger.

ATELIERS DE CONSTRUCTIONS ELECTRIQUES DE CHARLEROI, 56, Victoria Street, S.W.1.—July stock list of motors and dynamos.

The FULLER ACCUMULATOR CO. (1926), LTD., Woodland Works, Chadwell Heath, Essex.—List 266, giving particulars and prices of radio accumulators in glass containers.

MESSRS. P. F. BRITTAIN, LTD., 110, Cannon Street, E.C.4.—A price list of single-phase induction motors and starters.

MR. ALAN WRIGHT, 124, Chancery Lane, W.C.2.—Catalogue No. 45c, containing illustrated details and prices of "Hazemeyer" star-delta starters.

MR. ROBERT MACLAREN, 107, Canal Street, Glasgow, C.5.—A priced and illustrated pamphlet describing electrical temperature controllers for refrigerators, rooms, ovens, &c.

SIEMENS & ENGLISH ELECTRIC LAMP CO., LTD., 38-39, Upper Thames Street, E.C.4.—July price sheet of electrical materials and appliances. Illustrated.

THE GENERAL ELECTRIC CO., LTD., Magnet House, Kingsway, W.C.2.—Leaflets X4449, illustrating and describing double-pole switches and fuses; and V4463, describing a mechanical refrigerating machine for application to commercial installations.

MESSRS. A. REYROLLE & CO., LTD., Hebburn-on-Tyne.—Pamphlet No. 704, a well-illustrated publication dealing with the installation and use of "Reyrolle" plugs and sockets in the home and outdoors.

The ELECTRICAL EQUIPMENT & CARBON CO., LTD., Bank Buildings, 109-111, New Oxford Street, W.C.1.—Monthly stock list of motors and dynamos, carbons, bells and buzzers, cables, &c.

The CENTURY ELECTRIC CO., 1806, Pine Street, St. Louis, Mo., U.S.A.—Folders 653 and 532, dealing respectively with the company's double squirrel-cage motors, and "Century" split-phase motors.

MESSRS. HOUGHTON-BUTCHER (GREAT BRITAIN), LTD., 88-89, High Holborn, W.C.1.—"Houghton's Radio News" for June, containing notes on radio components, illustrations and prices, &c.

HOPKINSON INDUCTION MOTORS, Willesden Lane, North Acton, W.3.—July stock list of single- and three-phase motors.

HIGGS MOTORS, Witton, Birmingham.—July stock list of a.c. and d.c. motors. Priced.

BRITISH INSULATED CABLES, LTD., Prescot, Lancs.—A brochure containing a number of excellent views of buildings of several types in which the "Prescot" wiring system has been installed.

BROOKHIRST SWITCHGEAR, LTD., Northgate Works, Chester.—Catalogue No. 11, containing fully-illustrated particulars of the company's marine type control gear of d.c. hand-operated patterns. Priced. Also a brochure containing notes on and pictures of some actual installations.

Social Events.

On June 25th, the employés of the Saxonia Electrical Wire Co., Ltd., held their annual outing, when a party of 50 proceeded to Margate by train. The catering arrangements were in the hands of Messrs. J. Lyons & Co., Ltd., who served a hot luncheon at their head depôt, the chair being taken by the managing director, Mr. L. H. Euler, supported by Mr. R. Bruce. After lunch the usual seaside amusements received attention; many also took motor drives to Ramsgate and the surrounding country.

On June 30th, at the ground of the Hathersage Cricket Club, a cricket team composed of Sheffield electrical manufacturers, contractors, and factors, met a similar team from Leeds. Mr. R. Neill, Sheffield, presented a unique cup which, as it was not possible to conclude the game, was tossed for and won by the Sheffield team. Mr. C. Woods, Leeds, presented two bats for the best bowling and batting performances. Tea was served after the match, and it was followed by a smoking concert, the artists being all electrical men. It is the intention to arrange other social events; the joint hon. secretaries are Mr. G. Mountain, 11, New Station Road, Leeds, and Mr. H. J. Franey, 24, York Street, Sheffield.

The eighth annual sports and children's outing, organised by the Yorkshire Electric Power Co., took place on July 2nd, at Thornhill Rectory Grounds, kindly lent by the Rector. A perfect summer day favoured the event, and the beautiful grounds were at their best. The event is primarily a festival for the children of the company's staff, and with the exception of two (one each for ladies and gentlemen) the whole of the sports events are for children up to 15 years of age. Among those present were Mr. W. B. Woodhouse, engineer and manager, and Mr. J. J. H. Stansfield, secretary, of the company; the prizes were presented by Mrs. Woodhouse. At the conclusion of the proceedings each child was presented with a toy.

Venner Time Switches, Ltd., held their annual outing on July 4th. The party, guided by an elaborately-produced programme, proceeded by motor coach to Reading and embarked at Caversham Bridge aboard a steam launch. Luncheon and tea were served, and after tea the party went ashore for awhile. The return to London was made by motor coach. During the day there was an interesting ceremony at which Mr. Grazeby (managing director) and Mr. E. E. Sharp were presented with silver tea sets to commemorate the company's 21st anniversary and as a token of the employés' esteem.

The second annual sports meeting of the Union Cable Sports and Social Club was held at Dagenham on July 2nd, and although the sun failed to shine till late in the day, the weather was ideal for running. Mrs. Huddleston, who was presented with a bouquet by Miss D. Bailey on behalf of the Club, distributed the prizes, and after a short speech by Mr. J. Snow Huddleston, the Club's president, the day was brought to a close with dancing on the green.

Bankruptcy Proceedings.

G. PATERSON, trading as George Paterson & Sons, wireless parts factors, 107, Clerkenwell Road, E.C.—The first meeting of creditors was held on June 30th at the London Bankruptcy Court, a receiving order having been made on the petition of a creditor for £254. The debtor states that in 1925 he began business as a factor in screws and wireless parts. He possessed a capital of £500, but the business from the beginning proved a financial failure, he having started when a slump in wireless goods set in. He lost the whole of his capital and was compelled to close down; he was then indebted in the sum abovementioned to the petitioner, who was his only creditor. He has no assets, and attributes his failure to the slump in the wireless trade and to betting losses. The case remains in the hands of the Official Receiver.

F. LENG, 12, Godstone Road, Rotherham, trading as F. Leng & Co., electrical and mechanical engineer. The public examination of this debtor was held on July 7th, at the County Court Hall, Sheffield. The statement of affairs showed liabilities of £150 and no assets. The examination was closed.

J. EADE (J. Eade & Son), electrical contractor, 48, New Road, Skewen.—First meeting held July 13th, at the Official Receiver's offices, Government Buildings, St. Mary Street, Swansea; public examination, July 26th, at the Town Hall, Neath.

H. S. NADIN (carrying on business with A. E. & C. G. Channon as Channon & Co.), electrical engineer, 425, High Street, Cheltenham.—Application for discharge to be heard September 13th, at the Court House, Cheltenham.

J. T. NICHOLS, wireless parts merchant, late of 4, Glebe Road, Kingsland Road, E.—Trustee, Mr. P. M. Mordant, 115-117, Cannon Street, E.C.4, appointed June 30th.

R. FENTON, electrical engineer, late of 514, Sheffield Road, Chesterfield.—Last day for proofs for dividend, July 20th. Trustee, Mr. L. A. West, Official Receiver, 4, Castle Place, Nottingham.

H. B. POWELL, 10, Union Street, Hereford, wireless dealer.—First meeting, July 16th, at 2, Offa Street, Hereford. Public examination, July 18th, at the Shire Hall, Hereford.

J. F. CARR, 89, Aston Avenue, Fallowfield, Manchester, electrical goods agent.—Trustee, Mr. J. G. Gibson, Senior Official Receiver, Byrom Street, Manchester, released July 1st.

Dissolutions of Partnership.

MIDLAND MAGNETO & ELECTRICAL CO., electrical engineers, 6, St. John Street, Nottingham, and 57a, Humberstonegate, Leicester.—Mr. D. P. Holton and Mr. L. P. Pike have dissolved partnership. Debts connected with the Nottingham business will be attended to by Mr. Pike, who will continue the Nottingham business under the style of the Midland Magneto and Electrical Co. Debts connected with the Leicester business will be attended to by Mr. Holton, who will continue the Leicester business under the style of the Leicester Magneto and Electrical Co.

ECONOMIC GUARANTEED ELECTRIC LAMP CO., manufacturers and wholesale and retail dealers in electric lamps and fittings, 39, Furnival Street, E.C.4.—Mr. A. L. Golding, R. W. A. Burn, and A. S. Pickering, have dissolved partnership. Messrs. Burn and Pickering will attend to debts.

ALEXANDER LAYLAND & SON, plumbers and electricians, 102, Standishgate, Wigan.—Messrs. A. & R. Layland have dissolved partnership.

STEIN & JOHNSON, electrical contractors, &c., 11a, Station Street, Birmingham.—Messrs. J. H. W. Crow, F. A. B. Stein and A. Johnson have dissolved partnership. Debts will be attended to by Messrs. Crow and Johnson, who will continue the business under the same style.

Company Liquidations.

ROSE BROS. ELECTRICAL CO., LTD., 25, Milton Street, E.C., wireless and electrical dealers.—A meeting of creditors was held on July 7th, at the offices of Messrs. Corfield & Cripwell, Balfour House, Finsbury Pavement, E.C. The chair was occupied by Mr. W. A. J. Osborne, the liquidator in the voluntary liquidation of the company. An approximate statement of affairs was presented which showed ranking liabilities of £8,741. There was a deficiency as regarded the second debenture holders of £496, and there were no assets available for the unsecured creditors. The deficiency as regarded the creditors was £9,237. Mr. Osborne said that a receiver for the first debenture holders had been in possession of the assets for nearly two months; a committee of the principal creditors was appointed, and it had decided that the company should go into liquidation, and appointed him (Mr. Osborne) as liquidator. The receiver had continued the trading since his appointment, and a portion of the stock had been disposed of. The book debts might produce a little more than £1,000. Nothing had been allowed for the receivership and law costs, and there might only be some £300 or £400 available for the second debenture holders. Mr. Osborne said that the idea of his appointment was the resuscitation of the business, as it was hoped to save something for the creditors. He could not promise the creditors anything, but suggested that his appointment should be confirmed, and a committee of the principal creditors elected. If any terms could be made, they would probably involve the promotion of a new company in which some provision would be made for the present creditors in the form of preference shares. Mr. G. Bate, the solicitor to the company stated there was not much hope of sufficient fresh capital being forthcoming to enable the business to be continued, but Mr. Osborne said that if a new company was formed, the creditors could look for further business. A resolution was passed confirming the voluntary liquidation of the company with Mr. Osborne as liquidator, and an advisory committee of the representatives of four of the principal creditors was also nominated. The following are creditors:—

	£		£
British Battery Co., Ltd.	483	Francke & Co.	55
Telephone Fabric Co. ...	80	Grothe, A., Sohne ...	258
Browne, E., & Co., Ltd.	180	Grain, H.	69
Bangatz, Ltd.	20	Hawkins Bros., & Co. ...	25
Bochert, A.	170	Metro-Vick Supplies, Ltd.	29
Berliner Batterie Fabrik	375	Mullard Wireless Service Co., Ltd.	165
Bohmische Glut Co. ...	262	Newberger, J.	236
Crypto Electrical Co., Ltd.	23	Ragge, B.	171
Cleminson, M.	26	Rase, V. M.	175
Castellio	37	Spence, Paynter & Morris	30
Da & Deilith	168	Sanitas (Berlin)	143
Daiman Gesellschaft ...	34	Three Star Accumulator	
Ferranti, Ltd.	25	Co., Ltd.	129

INTERNATIONAL ELECTROLYTIC PLANT CO., LTD.—Winding up voluntarily. Liquidator, Mr. A. Cripwell, 12, Cherry Street, Birmingham. Meeting of creditors July 20th, at the Chamber of Commerce, New Street, Birmingham. Particulars of claims to be sent by August 31st to the liquidator, Mr. A. Cripwell, 12, Cherry Street, Birmingham.

LACY INDUCTION COIL CO., LTD.—Winding up voluntarily. Liquidator, Mr. G. S. Pitt, 27, Clement's Lane, E.C.4. Meeting of creditors at the office of the liquidator on July 18th. Particulars of claims by August 18th.

ROBINSON & HANDS ELECTRICAL CO., LTD.—A meeting of creditors is called for July 21st, at the Chamber of Commerce, Birmingham.

GRAY ELECTRICAL CO., LTD.—General meeting August 10th, at Balfour House, Finsbury Pavement, E.C.2, to hear an account of the winding up from the liquidator, Mr. W. A. J. Osborne.

BRITISH WIRELESS SUPPLY CO. (1924), LTD., Leeds.—Liquidator, Mr. A. M. Fairburn, Official Receiver and Liquidator, 1, Priory Street, Dudley, released July 5th.

WEAVERHAM ELECTRICITY SUPPLY CO., LTD.—Meeting of members August 12th, at the Weaver Offices, Northwich, to hear an account of the winding up from the liquidator, Mr. H. L. Dale.

Private Arrangements.

HARRY MOTRONI, trading as H.M. Radio and Cycle Stores, Rosyth.—A meeting of creditors was held recently at Dunfermline, when a statement of affairs was submitted which showed liabilities of £279 and net assets of £69, leaving a deficiency of £210. It was stated that a trust deed had already been executed, and a resolution was passed confirming it. The following are creditors:—

	£		£
Houghton-Butcher, Ltd.	79	Kemp, Mills & Co. ...	20
Bell Bros., Ltd.	44		

Limited Partnership.

SPEEDWAY MAGNETO SERVICES.—Registered July 7th. Business: Auto-electrical engineers. Address: 99a, Percy Street, Newcastle-upon-Tyne. Partnership for five years from June 14th, 1927, or immediately on registration. General partner: J. S. Jameson, "Sycamores," Brentwood Avenue, Monkseaton, Northumberland. Limited partner: W. H. Oliver, Fellside, Hexham, contributing £650 in cash.

Victoria and German Machinery.

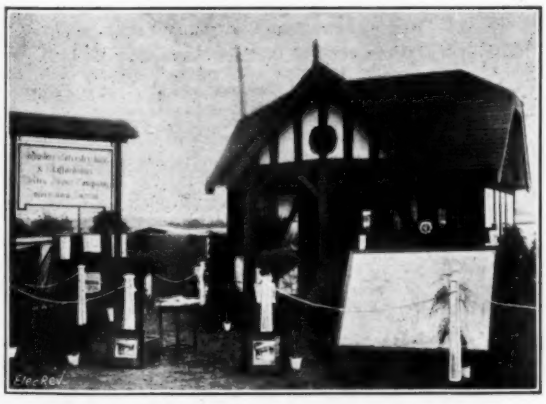
The Melbourne *Age* states that in view of the criticism to which the Victorian Electricity Commission has been subjected on account of its award of machinery contracts to German firms, figures have been prepared by the Commission showing the values of contracts placed by it to date. The total value of the contracts, including Customs duty, which were not of German manufacture, was stated to be £5,152,404, of which a large proportion had been for Australian manufactures. The total value of German manufactures, including duty, was £232,274. Those figures, it was stated, did not include the value of materials placed on ordinary order, which probably totalled £1,000,000, of which it was estimated that 70 per cent. at least was of Australian origin.

Unemployment.

There was an increase of 17,200 in the number of registered unemployed during the week ended June 27th. The total at that date was 1,004,600, as compared with 987,348 on June 20th, and 1,639,776 on June 28th, 1926 .

Electrical Publicity at an Agricultural Show.

The Shropshire, Worcestershire, and Staffordshire Electric Power Co. took advantage of the opportunity offered by the recent Three Counties Agricultural Show, at Worcester, to



Electricity at the Worcester Agricultural Show.

spread the electrical gospel. A small bungalow, or châlet, was arranged as an information bureau, as indicated by the sign which also appears in the accompanying illustration. Outside the building was a map of the company's area and a selection of photographs and "literature."

Electricity Meter Approved.

The Electricity Commissioners have approved the Ferranti single-phase watt-hour meter, type "F.D.c.," rated at 10 A at from 200 to 240 V, 50 cycles.

Australian Radio Valve Duties Postponed.

It is announced that the coming into force of the duties upon valves for wireless telegraphy and telephony imported into Australia has again been postponed—to January 1st, 1928.

For Sale.

Maidstone Electricity Supply Department has for disposal 11 Hyde Park carriers and 24 arc-lamp brackets. Walsall Corporation Electricity Supply Department invites offers for surplus second-hand generating plant. (See our advertisement pages to-day.)

Trade Announcements.

The RANSOME & MARLES BEARING CO., LTD., informs us that it has greatly extended its works to cope with the demand for its bearings and further extension is in progress. The company's monthly output now exceeds that of the whole of the four war years.

BRITISH B.A.G., LTD., has appointed Messrs. Mann, Egerton and Co., Ltd., Norwich, as its agents for the Eastern and South-Eastern Counties, London excepted. Messrs. Mann, Egerton & Co. will carry stocks of "B.A.G." goods.

Sir John Mann, receiver and manager of Fuller's United Electric Works, Ltd., announces that he has disposed of the assets of the Ebonite and Carbon Black Departments of the business of the company to Mr. H. Marks, on behalf of UNITED EBONITE MANUFACTURERS, LTD. (*vide* our "New Companies Registered" in this issue). Sir John is no longer carrying on any part of the business in any capacity and is not responsible for any goods ordered as from July 6th.

MESSRS. A. W. BEUTTELL, LTD., have opened new offices and showrooms at 96, Victoria Street, Westminster, S.W.1.

The Newcastle branch of the MARCONIPHONE CO., LTD., AND REDUCED, has been removed to Powdene House, Pudding Chare. (Telephone: Central 1107).

FOAMITE FIREFOAM, LTD., has taken new premises at 55-57, Gt. Marlborough Street, Regent Street, W.1. (Telephone: Regent 3105/6/7.)

The CHARLES WHITE ELECTRICAL CO., LTD., has extended its premises at 26, Upper Thames Street, E.C.4, and the trade counter has been removed to the front part of the premises opening out into Upper Thames Street.

MR. GEORGE SUTHERLAND has commenced business as an electrician at 7a, Wear's Yard, St. Ann's Staith, Whitby.

A new wireless depôt has been opened in Princes Street, Doncaster by Messrs. BARKER & WIGFALL.

Forthcoming German Exhibitions.

An important German Radio Exhibition is to be held in Berlin from September 2nd to 11th next.

Arrangements are in progress for the holding of an international electrical exhibition in Mannheim, in 1929, to demonstrate not only the progress of the electrical industry, but the increasing number of uses of electricity.

New Italian Companies.

Among the concerns recently organised in connection with electricity supply in Italy are the following:—La Società Imprese Elettriche dell Iglesias, Iglesias, capital 390,000 lire; La Società Idroelettrica Cismon, Rome, capital 100,000 lire; La Società Officine Auto-elettriche Roma, Rome, capital 15,000 lire; La Società Elettrica Solarussa, Solarussa (Cagliari), capital 58,000 lire; La Società Consorzio Idro-Elettrica, Ing. J. H. de Thierry & Co., Trinità (Cuneo), capital 3,150,000 lire; and La Società Italiana de Elettricita "Asea," Milan, capital 200,000 lire; and the Società Lucè Applicazione Elettriche, Milan, capital 10,000 lire.

New Belgian Company.

A company has recently been formed in Namur with a capital of 1,650,000 fr. and the title La Société Arsenal Namurois d'Appareils pour Laboratoires Industriels et Scientifiques "Analis," to manufacture electrical and scientific instruments.

New Indian Companies.

Among the companies recently organised in India in connection with electricity supply are the Jorhat Electricity Co., Calcutta (8, Clive Street), with a capital of 200,000 rupees, and the Nattarasankottel Electricity Supply Corporation, Ramnad, Madras, capital 200,000 rupees.

Dutch East Indies Trade.

In a recent Department of Overseas Trade report by Mr. H. A. N. Bluett (British Commercial Agent, Batavia) upon conditions in the Netherlands East Indies (Stationery Office, 3s. net), it is stated that orders for complete electric power plants are mostly placed abroad, in which respect Holland and Germany have been favoured. Oil, steam, and gas engines are purchased locally from engineering firms which carry stock, while orders for boilers are placed through firms which act as agents for British, Dutch, and German makers. Machinery will not sell merely on its reputation in a foreign country, and manufacturers should be prepared to lock up a few hundred pounds in a small consignment stock which will usually prove a sound investment. Local firms will not accept, even on consignment, machinery which they do not think has selling possibilities.

German Electrical Industry.

We have received a copy of the special Electrical Industrial Supplement to the *Frankfurter Zeitung*. It contains many articles on various aspects of electrical activity, technical, economic, domestic, and industrial, all written by experts, not the least interesting being a review of the British electrical industry by Sir Hugo Hirst, Bart.

Sierra Leone Electrical Imports.

The imports of electrical and telegraphic apparatus into Sierra Leone during last year attained a value of £20,322, as coinpared with £12,661 in 1925. The Dependency has now about 1,250 miles of telegraph and telephone lines in operation.

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Recent Contracts.

The High Commissioner for India recently placed with the BRITISH THOMSON-HOUSTON CO., LTD., an order for the complete sub-station and track-sectioning equipment for the electrification of the main lines of the Indian State Railways from Bombay to Igatpuri and from Bombay to Poona, which is being carried out to the plans of Messrs. Merz & McLellan. The supply is at 95,000 V, three-phase, 50 cycles, and at the sub-stations it is converted to 1,500 V, d.c., by means of step-down transformers and rotary convertors, each convertor comprising two machines in series. There will be seven double-unit sub-stations and four triple-unit sub-stations, so that the total number of rotary convertors will be 52, each with a rated output of 1,250 kW. Approximately half of the sub-stations will be semi-automatic, and from these the remainder will be controlled by supervisory control apparatus. The track-sectioning cabins will be automatic, giving back indication by means of supervisory control apparatus to the attended sub-stations. The British Thomson-Houston Co. is manufacturing the convertors, control gear, 95,000-V switchgear and lightning arresters, and 1,500-V switchgear, at its own works at Rugby and Willesden. The sub-contractors for the transformers are the British Electric Transformer Co., Ltd., and for the supervisory control equipment, Standard Telephones & Cables, Ltd.

Over one mile of gun-control cable for H.M.S. *Nelson*, the £7,000,000 battleship (completed by Messrs. Sir W. G. Armstrong & Co., Ltd.), has been manufactured by EDISON SWAN CABLES, LTD. This 1¼-inch cable is of 28-core construction, each core being composed of 110 tinned-copper wires of .0076 in. diameter, stranded around 12 tinned-steel wires, each .0124 in. diameter, insulated with pure vulcanised india-rubber and lapped with a numbered tape. The cores are cabled together and sheathed with a thick wall of cab-tire compound. Cable of the same type has also been supplied by the company for H.M.S. *Suffolk*, H.M.S. *Cornwall*, and H.M.S. *Berwick*.

The Liverpool Corporation has decided to install an up-to-date fire-alarm and police-telephone system, and has placed a contract with STANDARD TELEPHONES AND CABLES, LTD., for the supply of 200 "Gamewell" fire-alarm boxes. The whole of the work will be carried out at the company's factory at Hendon.

The Times reports that an order has recently been placed with the ENGLISH ELECTRIC CO., LTD., for water turbines and electric generators having a total power of 40,000 h.p., which will supply current to the electric furnaces at the new Lochaber works of the British Aluminium Company. The generators at the same company's older water-power station of Kinlochleven are of the same manufacture and have been in operation for 20 years.

MESSRS. SIMON-CARVES, LTD., have recently received an order from the Vale of Neath Colliery Co., Ltd., for two "Simon-Carves" boilers, each to evaporate 25,000 lb. of water per hour and fired by anthracite duff pulverised in "Simon-Carves" unit pulverisers. The contract includes boilers, economisers, superheaters, chimney, coal bunkers, coal-pulverising and handling plant and the necessary building.

Gold Coast Electrical Imports.

The *Board of Trade Journal* shows that during 1925 electrical machinery valued at £21,893 and electrical and telegraphic apparatus valued at £36,269, were imported into the Gold Coast.

Czecho-Slovakian Trade with Great Britain.

A report upon conditions in Czecho-Slovakia has been prepared for the Department of Overseas Trade by Mr. A. A. Adams, British Commercial Secretary at Prague (Stationery Office, 1s. 6d. net). The electrical industry is not specifically dealt with, but it is stated that industry as a whole took a backward step in 1926. Appendices show the extent of trade between Czecho-Slovakia and this country during 1926, and it is seen that the exports to Great Britain of electrical machines and apparatus amounted to 231 tons, valued at 6,014,000 crowns (about £36,700). At the same time Great Britain exported to Czecho-Slovakia 40 tons of electrical machinery and apparatus valued at 5,126,000 crowns (about £31,400).

The Japanese Electrical Industry.

Recent orders placed by Japanese undertakings with native electrical firms indicate the growing capacity of the Japanese electrical industry. For instance, the Imperial Government Railway administration has ordered seven electric locomotives from the Shibaura, Mitsubishi, Hidachi and Kawasaki concerns. The orders are said to be trials in connection with the complete electrification of the State Railways. The locomotives will weigh 100 tons each, and will be used on the Tokaido line.

The Shibaura Engineering Works recently secured an order for rotary convertors from the Nippon Chisso Hiryo K.K. A price of 1,030,000 yen was quoted, which was considerably lower than the tenders of British, German, and American manufacturers. The second highest tender was, however, that of the Mitsubishi concern (1,600,000 yen).

The present Ministry has determined to follow the policy of its predecessors in giving preference to Japanese products, even where the price is higher, provided that there is a likelihood of its falling to the foreign level in the future.

Italian Borrowing in America.

Out of the loans obtained in Italy from the United States to the amount of $200,000,000, it is stated that the sum of $85,000,000 has been invested in the electrical industry. This will permit of the production of energy being increased by about 1,000,000,000 kWh per annum, reducing the value of coal imports by 150,000,000 lire annually.

Book Notices.

"Electrical Transmission and Distribution at Collieries, or a Guide to Cable Sizes," by W. T. Anderson, M.I.E.E., and H. M. Crellin, A.M.I.E.E. (23 pp.). Manchester: W. T. Glover & Co., Ltd. Gratis.—This is a reprint of a paper read before the Association of Mining Electrical Engineers from the Association's journal.

"Navigational Wireless," by S. H. Long. Pp. xi+164; figs. 162. Price, 12s. 6d. net. "Electrical Engineering Practice," by J. W. Meares and R. E. Neale. Fourth edition, Vol. II. Pp. xii+532; figs. 244; plates. Price, 25s. net. "The Working of Aluminium," by E. T. Painton. Pp. ix+214; figs. 64. Price, 13s. 6d. net. London: Chapman & Hall, Ltd.

"Modern Electrical Illumination," by C. Sylvester and T. E. Ritchie. Pp. xi+416; figs. 367. London: Longmans, Green and Co., Ltd. Price, 42s. net.

"*Post Office Electrical Engineers' Journal.*" Vol. XX. Part 2. July, 1927. London: Electrical Review, Ltd. Price, 1s. 6d. net.

The current issue of the quarterly *Chilean Review* (10s. per year, post free) contains many well-illustrated articles upon a diversity of Chilean matters. Included among them are articles entitled "Electrifying Chile," "Santiago by Night" (showing the excellent lighting of the city), "The Rivers of Chile," and "Automatic Telephones in South America."

American Enterprise in Hungary.

It is reported that negotiations are approaching completion under which the Standard Electric Company will acquire majority control of the telephone works of the Ver. Gluhlampenfabrik in Hungary. The latter is to transfer the telephone works to an independent company in which the Standard Company will hold most of the shares. The American company recently acquired a considerable holding in the Ver. Telephonfabrik (late Czeija, Nissl & Company) of Vienna.

American Electrical Exports to India.

According to a recent official return, the imports of American electrical machinery into India during last year attained a value of £146,840, as compared with £124,870 in 1925. There was also an increase in the imports of American electrical fittings and goods—from £147,288 to £237,750.

New Australian Electrical Works.

The Sydney Press reports that the Australian General Electric Co. has decided to erect very large works at Newcastle (N.S.W.). It is stated that the works will, in the course of a few years, provide work for thousands of men.

Examining Pearl Lamp Filaments.

When "Pearl" (internally-frosted) lamps fail it is sometimes difficult to diagnose the cause. This is rendered simple by a method of which the General Electric Co., Ltd., has notified us. By holding a piece of opaque cardboard with a pinhole in it between an ordinary gasfilled lamp and the "Pearl" lamp to be examined, provided both lamps are in close proximity to the pinhole, a distinct silhouette of the filament and supports will be cast on the walls of the "Pearl" bulb which enables any break or sagging to be observed.

Irish Free State Electrical Imports.

The imports of electrical goods, excluding machinery, into the Irish Free State during May last were valued at £30,389, as compared with £16,159 in May, 1926. The aggregate imports during the first five months of the year are officially returned at £162,192, as compared with £175,658 in the corresponding period of last year.

New French Companies.

The American Radio Corporation (France) has lately been formed in Paris (23, Rue Renard) with a capital of 250,000 fr., to engage in the radio trade in France.

La Société Radio-Lyon-Emissions is the name of a company which has been formed in Lyons, with a capital of 400,000 fr., with the object of establishing broadcasting stations in the Rhône, Upper Savoy, and neighbouring departments.

International Fair at Salonica.

Reuter's Trade Service reports that among the principal articles to be exhibited at the second International Fair at Salonica (to be held from September 18th to October 3rd, 1927) are machinery in general, turbines, motors, tools and spares, and electrical apparatus, dynamos, motors, transformers, lighting and heating appliances, and tools. The site being considered a Custom House free area furnishes the privilege of exemption from any duties or taxes on goods destined for the Fair, and special railway concessions are granted to exhibitors and exhibits.

Anglo-German Industrial Conference.

A further conference between British and German industrialists took place in Berlin last week. The British representatives included Lord Gainford, president of the Federation of British Industries, Mr. D. A. Bremner, director of the British Engineers' Association, and Mr. F T. Nugent, director of the F.B.I. Dr. Duisberg was among the German representatives. It was mutually agreed that the parties should make representations to their respective Governments for the removal of export restrictions; the unification and simplification of tariff nomenclature, and the extension of international trade statistics. It was also decided to endeavour to secure for the leading European industrial federations proper representation upon League of Nations' Commissions dealing with industrial questions.

Reuter says that a communiqué was issued stating that questions relating to insurance of exports, double taxation, and exhibitions and fairs were discussed and that agreement was reached between the British and German delegates on all points in these matters.

Prices of Raw Materials.

The following prices are only general, and they may vary according to quantities and other circumstances:—

CHEMICALS, &c.	Price July 12th.	Fortnight's inc. or dec.
a Acid, Oxalic ... ... per lb.	5¾d.	...
a Ammoniac, Sal ... ... per ton.	£60	...
a Ammonia, Muriate (large crystal) ,,	£32	...
a Bisulphide of Carbon ... ... ,,	...	...
a Borax ... ... ,,	£25	...
a Copper Sulphate ... ... ,,	£25 10s.	...
a Potash, Chlorate ... ... per lb.	4d. to 4½d.	...
a ,, Perchlorate ... ... ,,	5½d.	...
a Shellac ... ... per cwt.	£13 10s.	...
a Sulphur, Commercial ... ... ,,	£9 10s.	...
a ,, Roll ... ... ,,	£9 10s.	...
a Soda, Chlorate ... ... per lb.	3¾d. to 3¾d.	—
a ,, Crystals ... ... per ton.	£5 to £5 5s.	...
a Sodium Bichromate, casks ... per lb.	4d.	—
METALS, &c.		
b Aluminium, Ingots... ... ... per ton.	£107 to £112	...
b ,, Wire ... ... per lb.	1/6 to 2/-	...
b ,, Sheet ... ... ,,	1/8 to 2/9	...
p Babbitt's Metal and Anti-friction Metal—		
Grade I ... ... per ton net.	£249	£11 dec.
Grade II ... ... ,, ,,	£174	£6 dec.
Grade III... ... ... ,, ,,	£91	£2 dec.
c Brass (rolled metal 3' to 12' basis) per lb.	9¾d.	...
c ,, Tubes (solid drawn) ... ,,	11½d. to 11¾d.	...
c ,, Wire, basis ... ... ,,	9¾d.	...
c Copper Tubes (solid drawn) ... ,,	1/0½	...
c ,, Bars (best selected) ... per ton.	£84	...
c ,, Sheet ... ... ,,	£84	...
c ,, Rod ... ... ,,	£84	...
d ,, (Electrolytic) Bars ... ,,	£60	5s. dec.
d ,, ,, Sheets ... ,,	£148 10s.	...
d ,, ,, Wire Rods ... ,,	£70	5s. dec.
d ,, ,, H.C. Wire per lb.	8¼d.	...
f Ebonite Rod ... ... ,,	2/8 to 2/6	...
f ,, Sheet ... ... ,,	2/8 to 2/6	...
g German Silver Wire ... ... ,,	2/2	...
h Gutta-percha, fine ... ... ,,	8/-	—
h India-rubber, Para fine ... ... ,,	1/4	¾d. dec.
i Iron Pig (Cleveland No. 3.) ... per ton.	75/-	...
i ,, Wire, galv. No. 8, P.O. qual. ,,	£31	...
g Lead, English pig ... ... ,,	£26	...
g Mercury ... ... per bot.	£21 15s. to £22	...
e Mica (in original cases) small ... per lb.	3d. to 8/-	...
e ,, ,, medium ,,	4/- to 8/-	...
e ,, ,, large ... ,,	10/ to 20/- & up.	...
p Phosphor Bronze, plain castings ,,	1/3½	...
p ,, ,, drawn bars & rods ,,	1/8	...
p ,, ,, rolled strip & sheet ,,	1/2½	...
p ,, ,, wire... ... ... ,,	1/8½	...
e Platinum ... ... per oz.	£14 10s.	...
d Silicium Bronze Wire ... ... per lb.	10½d.	...
r Steel, Magnet, in bars ... ... ,,	7½d.	...
n Tin, Block (English) ... ... per ton.	£280 to £280 10s.	£13 5s. dec.
a ,, Wire, Nos. 1 to 16 ... ... per lb.	4/9	...

*For 1 cwt. lots. Special quotations against definite specifications.

Quotations supplied by

a G. Boor & Co.
b The British Aluminium Co., Ltd.
c Thos. Bolton & Sons, Ltd.
d Frederick Smith & Co.
e F. Wiggins & Sons.
f India-Rubber, Gutta-Percha and Telegraph Works Co,. Ltd
g James & Shakespeare.
h Edward Till & Co.
i Bolling & Lowe.
j Richard Johnson & Nephew, Ltd.
n P. Ormiston & Sons.
o Johnson, Matthey & Co., Ltd.
p C. Clifford & Son, Ltd.

W. F. Dennis & Co.

Reporting on July 9th, on the lead market, Messrs. James Forster & Co. stated:—

"The market this week has again been affected by the weakness in America, where consumption still declines, and, as a consequence, the official price there has been lowered a further 20 points, to 6.20 cents. The position in this country is unchanged, with supply and demand evenly balanced. Consumption, except in the electrical cable trade, is showing improvement, while arrivals are not excessive; in fact, lead has been drawn from warehouse this week to meet consumers' immediate requirements. The future once more turns on the position in America, where, owing to the excessive production and falling consumption, surplus lead is on offer to Europe, thereby depressing the London market. As long as this continues prices will fall still lower, as Europe has quite enough lead to take care of from other sources. Either production in America must be still further curtailed, or consumption increased, before any definite improvement can be expected in prevailing conditions."

Great Britain's Radio Exports.

We are again indebted to the *Wireless Trader* for details of the exports of radio apparatus from this country during May. The total value of these was £83,809 (including valves £20,954), as compared with £109,092 (valves £21,746) in April. Australia was again our principal customer, having taken goods to the value of £21,444 (valves £11,597); India, including Burma and Ceylon, was second, with £13,834 (valves £1,189). Our chief foreign customer was France, whose share was valued at £5,802 (valves £125), the Netherlands being a close second with £5,416 (valves £137). Japan took goods valued at £3,800 (valves £2,280).

The New Railway Rates.

As foreshadowed in the article upon this subject in our last issue (p. 53), the Railway Rates Tribunal has fixed January 1st, 1928, as the "appointed day" upon which the new rates shall come into force. We would remind those readers who are directly affected that the article referred to contained some valuable information regarding the changes which are being made in goods classification, &c., with particular reference to the electrical industry.

Electric Meter Manufacture in Russia.

We are informed that on June 29th there was opened in Leningrad the first factory in Russia for the production of electric meters. Till now all the electric meters used in the country have had to be imported from abroad. The output capacity of the factory is 60,000 electric and other meters per annum.

Lighting and Power Notes.

Australia.—VICTORIA.—The *Electrical Engineer of Australia and New Zealand* reports that the quarterly statement of the Victorian Electricity Commission relative to its operations during the period January-March, 1927, shows that the total amount of energy sold was 59,577,802 kWh, as compared with 40,028,712 kWh last year, and the maximum demand was 56,000 kW, as against 37,000 kW. The revenue amounted to £232,357 (£112,245), and the expenditure, including interest but not depreciation, totalled £224,257 (£167,023). There are now 92 towns and districts taking supply from the Commission.

Excellent progress is being made in the construction of the hydro-electric scheme at the Rubicon and Sugarloaf. The *Industrial Australian and Mining Standard* states that at the Sugarloaf the foundations of the power stations are being laid, and the construction of the switchboard foundations and the steelwork for the outdoor switchgear is well advanced. The first sections of the pipe to supply the turbines have been installed. At the Rubicon all water races for the mountain stream stations have been excavated, and lined with concrete throughout. The centre of operations is at the diversion weirs on the headwaters of the Royston and Rubicon rivers. The Royston Weir is partially complete, and the foundations are being prepared on the Rubicon site. The concrete anchors for the Rubicon pipe line are in position ready for the erection of the special high pressure steel pipes under construction. The excavations for the Rubicon power stations are practically complete, and the concrete foundations for the machinery are being laid. At the Rubicon "A" sub-station all the switchgear foundations have been concreted, and the erection of the steelwork for outdoor switchgear is in progress. The total output of energy from the Rubicon-Sugarloaf scheme will be 137,000,000 kWh per annum, of which the Sugarloaf station will contribute 51,000,000 kWh during the average year. Transmission lines have already been erected to join up with the main northern transmission line from Thomastown.

Basingstoke.—YEAR'S WORKING.—The accounts of the Corporation electricity undertaking (engineer: Mr. F. Swarbrick) for the year ended March 31st last record a total revenue of £21,098, and working expenditure of £12,060, leaving a gross profit of £9,038. The figures for the preceding year were:—Income, £18,573; working expenses, £10,482; gross profit, £8,091. After payment of capital charges there was a net surplus of £3,222, as compared with £3,031 in the preceding year. The sales of electricity increased from 1,571,441 to 1,804,448 kWh, and the maximum load from 798 to 916 kW. The average price obtained per kWh fell from 2.84d. to 2.80d.

Birmingham.—YEAR'S WORKING.—The Corporation Electric Supply Department (engineer: Mr. R. A. Chattock) in its report for the year ended March 31st last, states that additional capital to the extent of £1,109,620 was borrowed during the year, the actual expenditure being £1,006,108, extensions of buildings and plant absorbing £568,000, and additions to the distributing system £438,000. The total capital raised for the purposes of the undertaking was £7,857,490, of which £2,602,527 has been redeemed; £233,685 being the year's provision for capital redemption out of revenue. The quantity of electrical energy sold during the year was 234.22 million kWh,

an increase of 9½ millions. The revenue from all sources was £1,537,292, an increase of £213,462. Working expenditure at £884,104 showed an increase of £156,567, of which £118,005 was in respect of fuel. The average total cost per kWh sold increased by 14.86 per cent., and the average price received per kWh for all classes of supply, by 11.72 per cent. After providing for all capital charges, including £233,685 for redemption of debt, there remained a surplus of £172,755, comparable with £184,012 for the preceding year. Allowing for the agreed contribution of £31,000 to the borough rate fund, the balance to £141,755 was carried to renewals and special expenditure account. The amount brought into reserve fund account at the beginning of the year was £108,701, and that had been increased by the yield from investments and appreciation of securities to £113,539 as at March 31st, 1927.

Reference is also made to the introduction of a new tariff as an alternative to the existing flat rate to residential premises, similar to that in operation in a large number of other towns.

Blackburn.—YEAR'S WORKING.—We have received from Mr. P. P. Wheelwright, borough electrical engineer, a copy of his report, together with the accounts of the Corporation electricity undertaking for the year ended March 31st last. The total income amounted to £189,120, as compared with £172,025 in the preceding year. Working expenses increased from £70,869 to £121,368, for which the higher cost of coal was largely responsible, leaving a gross surplus of £67,751 (£101,156), to which was added an unemployment grant of £254, and £247 from the sale of old machinery, making a total of £68,253. Capital and other charges amounted to £126,913, and there was a net deficit of £58,660, as compared with a deficit of £22,509 in 1925-26. The capital expenditure during the year amounted to £143,899, the chief item being £115,507 for mains and distributing plant. The sales of electrical energy decreased from 23,200,170 to 21,890,549 kWh, the falling off being entirely due to reduction in power consumption. Owing to the bad state of the cotton trade there was a decrease of nearly 3,000,000 kWh from four large power consumers alone. Fortunately this was partly counterbalanced by increases of 14 per cent. and 82 per cent. in the consumption for lighting and heating respectively.

Bradford.—STREET LIGHTING.—The city electrical engineer (Mr. T. Roles) has reported to the Finance and General Purposes Committee that the work of changing over the street lighting on the tramway and railless-car routes from gas to electricity is now practically completed. A sub-committee has considered the advisability of using electricity in lieu of gas for street lighting in districts of the city within the supply areas of certain gas companies. The city electrical engineer has been instructed that where and when opportunities arise in connection with extensions of mains for other purposes in such districts, a report on the question of street lighting, with estimates of costs, should be presented from time to time to the Committee.

Bridgend.—INAUGURATION OF NEW PLANT.—The new plant recently installed at the electricity works was formally inaugurated by the chairman of the Town Council on July 8th.

Bristol.—LOAN.—The Committee has recommended that application be made for sanction to the following loans:—Sub-station buildings, £20,000; sub-station plant, £30,000; mains, £50,000; electric cookers, £10,000.

Bromley (Kent).—PURCHASE OF UNDERTAKING.—The Town Council has applied for sanction to a loan of £150,000 for the purchase of the undertaking of the Bromley (Kent) Electric Light and Power Co., Ltd. The actual sum payable to the company is £141,088. Mr. A. H. Dykes, who acted as consulting engineer in connection with the matter, is to be paid a fee of 650 guineas.

Canada.—HYDRO-ELECTRIC DEVELOPMENT.—Engineering plans are now being put into effect by the Hydro-Electric Power Commission of Ontario whereby the water power of the Nipigon River will be developed to its full capacity of 260,000 h.p. in a comparatively short time. At present the Cameron Falls station has a capacity of 75,000 h.p., and is feeding the Thunder Bay transmission system, which is supplying a rapidly-growing market for power at Fort William and Port Arthur. A short distance below Cameron Falls, construction of a 55,000-h.p. development at Alexander Landing is under way, and the new plans include the development of 100,000 h.p. at the Virgin Falls and Portage Landing sites. Pulp and paper companies are among the large users of power from the Thunder Bay system. A deputation from Port Arthur and Fort William recently pointed out to the Hydro-Electric Commission that the Great Lakes Paper Company, which now requires 8,000 h.p., expected to require 20,000 h.p. at an early date, and that the Nipigon Paper Company, which takes 3,000 h.p., anticipates increasing its power requirements to 10,000 h.p. in the near future.

Carlisle.—YEAR'S WORKING.—The accounts of the city electricity undertaking (engineer: Mr. C. W. Salt) for the year ended March 31st last record a total revenue of £83,713, as compared with £77,560 in the preceding year. Working expenses increased from £37,808 to £58,588, the cost of coal showing an increase of over £19,000, and the gross profit was £25,125 (£39,753), to which was added an unemployment grant of £6,000, making a total of £31,125 available. Capital charges, &c., amounted to £34,114, and the net result was, therefore, a deficit of £2,989, as compared with a surplus of £8,109 in 1925-26. The capital expenditure during the year was £93,944, of which £76,163 was expended on the new power station. The electrical energy sold increased from 10,073,720 to 10,408,707 kWh, and the maximum supply demanded from 5,256 to 5,450 kW. There was a slight increase in the average price obtained per kWh from 1.85d. to 1.93d.

Continental.—GERMANY.—The Reich Statistical Board has recently published the results of the census of the generation of electricity in the year 1925. The report shows that the production of energy in 1925 amounted to 20,300,000,000 kWh, or 325 kWh *per capita* of the population. The statistics apply to 8,726 industrial establishments and public electricity supply works. The latter (1,370) produced 9,910,000,000 kWh, the industrial plants 10,410,000,000 kWh, while the remaining 1,234 works were distributing undertakings. The influence of the public authorities on the whole extends to 76 per cent. of the production at the public supply works, and 49 per cent. of the distributing works. The industrial and trading undertakings absorb 80 per cent. of the output, transport services 5 per cent., and agriculture 3 per cent. The interchange of energy is represented by imports of 306,900,000 kWh, and exports of 78,400,000 kWh.

FRANCE.—The Société d'Entreprises Hydrauliques et d'Utilisation Industrielle des Marées, of Paris, is erecting an interesting plant near St. Malo, Brittany, to utilise the power of the tides for the generation of electricity. The plant will be located in the estuary of the River Rance about six miles from St. Malo, and will have an output of 450 million kWh per annum. It is stated that the tides in this district are such that there is a maximum difference of over 55 ft. between high and low tides. The undertaking is being financed by the French Government and by the authorities of the Department of Ille-et-Vilaine. A similar scheme projected for the supply of electricity to Brest was described in the ELECTRICAL REVIEW for August 29th, 1924.

Dartford.—ELECTRICITY IN BULK.—The Urban District Council has approved the draft agreement for the purchase of electricity in bulk from the West Kent Electric Power Co., Ltd. The Electricity Committee reports that consequent upon the decision of the Council to take an entire bulk supply of electricity, it becomes necessary to install further converting plant to take the place of the existing 600-kW, d.c. steam-driven set which has hitherto acted as a standby, and the Committee therefore recommends that application be made for sanction to a loan of £3,750 for the installation of one 750-kW set.

Heston and Isleworth.—LOAN.—The Urban District Council is seeking sanction to a loan of £12,000 for mains.

Hornsey.—LOAN SANCTIONED.—The Corporation Electricity Committee has received sanction to the borrowing of £30,000 for mains and services.

Horton.—REVOCATION OF ORDER.—The Parish Council has decided to again ask the Electricity Commissioners to revoke the Order of 1906 authorising the Slough Electric Supply Co., Ltd., to supply electricity to the parish, and to permit another company in the district to give a supply.

Ilford.—LOANS SANCTIONED.—The Corporation Electricity Committee has received sanction to loans of £1,000 for wiring consumers' premises, and £1,000 for the purchase of domestic apparatus in connection with the hire-purchase scheme.

India.—HYDERABAD.—It has now been decided to completely overhaul the existing electrical power house at Hyderabad and construct a new station at the present site on the pulverised fuel system. The power house is designed for an ultimate capacity of 20,000 kW, and expenditure incurred so far is Rs.40 lakhs. The plant in this new station consists of two Metropolitan-Vickers turbo-alternators; switchboards by Messrs. A. Reyrolle & Co.; condensing system by Messrs. Hick, Hargreaves & Co.; pumps and filters by Messrs. Worthington, Simpson & Co.; and four 20,000-lb. Spearing boilers, these being fired by Gamlen's development of Seymour's powdered fuel system. At present the new station, which is half the ultimately designed capacity, works at pressures of both 3,300 V and 6,600 V, but owing to the distance to which electricity has to be transmitted the latter voltage is to be the standard.

Kingston-on-Thames.—LOAN.—The Town Council has applied for sanction to a loan of £66,563 for electricity purposes, including the provision of coal conveying plant, superheaters, and mains extensions.

Liverpool.—LOAN SANCTIONED.—The Tramways and Electric Power and Lighting Committee has received sanction to the borrowing of £185,750 for the provision of generating plant and cooling towers at Lister Drive power station.

Maidstone.—LOAN.—The Town Council has applied for sanction to a loan of £30,000 for mains.

Manchester.—PROGRESS DURING MAY.—During the month of May the Corporation electricity undertaking showed an increase in connections of 2,768 kW, bringing the total to 322,542 kW; and the number of applications received for supply, including consumers for additional supplies, was 1,164, representing a total of 2,977 kW. The number of hired cookers connected increased by 146, bringing the total actual on cir-

cuit to 3,321. Applications for the hire of cookers totalled 152. One 250-kVA and two 100-kVA transformers were installed at three existing sub-stations.

Morocco.—ELECTRICAL DEVELOPMENT.—The Société Marocaine de Distribution d'Eau de Gaz et d'Electricité is now supplying electricity to 10,239 consumers in the Casablanca district of Morocco, the sales having increased from 8,927,793 kWh in 1925 to 12,652,260 kWh last year. The distribution system now comprises 23½ miles of h.p. and about 77 miles of l.p. mains. In the Rabat-Salè district the number of consumers increased during 1926 from 4,886 to 5,768, the sales of electricity amounting to 1,768,360 kWh. The company has also recently commenced a supply of electricity in the Meknes district.

Oldham.—LOANS.—The Corporation Electricity Committee is applying for sanction to loans of £50,000 for mains, and £15,000 for transformers.

Plymouth.—APPLICATION FOR ORDER WITHDRAWN.—At a recent meeting of the Electricity Committee, the town clerk reported that the Urban District Council of Torpoint had withdrawn its application for an Order, under which it was proposed to obtain a bulk supply of electricity from the Corporation.

Price Reductions.—Reductions in the charges for electricity have been made or recommended in the following districts:—

SIDMOUTH.—A reduction of 1d. per kWh.

BATH.—The 10 per cent. increase imposed owing to the coal dispute has been removed.

KINGSTON-ON-THAMES.—Lighting: From 6½d. to 6d. per kWh. Heating and cooking: From 1½d. to 1d. per kWh. Lighting of churches, exterior of business premises, theatres, &c.: From 6d. to 5½d. per kWh.

Reigate.—ELECTRICITY SUPPLY.—The Town Council has received from Messrs. Handcock & Dykes a report upon the electricity supply system, together with a plan showing the proposed arrangement of sub-stations, zones, and disconnecting pillars. The cost of the scheme is estimated at £44,896.

Sheffield.—MAINS EXTENSIONS.—During the past month the Corporation Electric Supply Committee approved extensions of mains, at an estimated cost of £11,273.

Special Orders.—Application has been made to the Electricity Commissioners for a Special Order by the Norwich Corporation authorising it to supply electricity in the borough of Thetford, and parts of the rural districts of Aylsham, Depwade, Erpingham, Lodden and Clavering, Mitford and Launditch, St. Faith's, Smallburgh, Thetford, Walsingham, Wayland, and Brandon.

The Commissioners have submitted to the Minister of Transport for confirmation Special Orders made by them, authorising the Minehead Electric Supply Co., Ltd., to supply electricity in the urban district of Watchet, and part of the rural district of Williton, and the Southwold Electricity Supply Co., Ltd., to supply in the borough of Southwold and part of the rural district of Blything.

Tunbridge Wells.—YEAR'S WORKING.—The report on the working of the Corporation electricity undertaking (engineer: Mr. R. N. Torpy) for the year ended March 31st last records a total revenue of £60,996. Working expenses amounted to £39,687, and there was a gross profit of £21,309, to which was added bank interest of £161, making a total of £21,470 available. Capital charges absorbed £15,123, resulting in a net surplus for the year of £6,347. The capital expenditure during the year amounted to £49,043, and included £25,964 for mains and services. There was a considerable increase in the sales of electricity, from 3,727,908 to 5,950,182 kWh, and the maximum supply demanded also showed a considerable advance, from 2,350 to 3,650 kW.

Walsall.—YEAR'S WORKING.—We have received from Mr. H. A. Howie, borough electrical engineer, a copy of his report, together with the accounts of the electricity undertaking for the year ended March 31st last. The total revenue amounted to £117,502, as compared with £104,122 in the preceding year. Working expenses amounted to £72,859, an increase of £13,418, the greater portion of the increased expenses being due to the higher cost of fuel, which accounted for an extra £70,793, and the gross profit was therefore £44,643 (£44,691), to which was added an unemployment grant of £949, making a total of £45,592. After payment of capital charges there was a net surplus of £7,823, as compared with £13,065 in 1925-26. The capital expenditure during the year, which included £30,066 for mains and services, amounted to £40,985. The electrical energy sold increased from 16,015,163 to 16,334,745 kWh, and the maximum supply demanded from 6,500 to 7,100 kW. An agreement was signed by the Corporation during the year for the transfer of Birchills power station to the West Midlands Joint Electricity Authority, and in connection with this agreement orders have been placed for extensions to the station which will increase its capacity from 13,000 to 23,000 kW.

Watford.—LOAN SANCTIONED.—The Corporation Electricity Committee has obtained sanction to a loan of £7,000 for a feeder to Kings Langley.

Willesden.—REVISED CHARGES.—The Urban District Council has reverted to the electricity charges in force prior to the coal dispute, and has considerably reduced the hire charges for domestic apparatus.

Wimbledon.—NEW PLANT.—At a recent meeting of the Corporation Electricity Committee, the town clerk reported the receipt of letters, from the Electricity Commissioners, referring to the Council's application for consent to install a 6,000-kW turbo-alternator, together with the necessary boiler plant, &c., and for sanction to a loan of £75,000 to meet the cost thereof. The Commissioners state that in the light of the probable effect of a scheme under Section 4 of the Electricity (Supply) Act, 1926, at present in course of preparation, they are of opinion that any extension of the generating station should be limited to one set of 3,000-kW capacity, and they would be prepared to consider favourably an amended application on that basis.

York.—YEAR'S WORKING.—The report on the working of the city electricity undertaking (engineer: Mr. E. J. Nichols) for the year ended March 31st last shows a total income of £120,301, as compared with £105,878 in the preceding year. Working expenses amounted to £71,799, as against £58,772, leaving a gross surplus of £48,502 (£47,106). Interest and sinking fund charges absorbed £29,478, and there was a net profit of £19,024, as compared with £18,366 in the previous year. A contribution of £3,008 was made to the district fund. The capital expenditure amounted to £47,893, and included £22,030 for machinery, and £22,873 for mains and services. The sales of electrical energy increased from 17,454,837 to 18,867,241 kWh, and the maximum supply demanded from 7,559 to 8,491 kW.

Tramway and Railway Notes.

Burnley.—YEAR'S WORKING.—The report of the general manager of the Corporation tramway undertaking (Mr. H. Mozley) for the year ended March 31st last records a total income of £160,215, as compared with £167,298 in the preceding year. Working expenses decreased from £129,444 to £125,577, leaving a gross profit of £34,637 (£37,854), from which was deducted expenditure in excess of income on the motor-omnibus undertaking of £2,682, making a total of £31,955 available. After payment of capital charges and rents for tramways owned by outside authorities there was a net surplus of £9,268, which was transferred to relaying and renewals account. The result for the previous year was a surplus of £14,352. The number of passengers carried decreased from 23,954,647 to 22,659,789, and the car miles run from 1,953,611 to 1,923,679.

Continental.—BELGIUM.—A new local electric railway has just been completed and opened for traffic by the Société Nationale des Chemins de Fer Vicinaux between Klapdorp (Antwerp) and Eeckeren, a distance of five miles.

London.—KINGSWAY SUBWAY ENLARGEMENT.—The Highways Committee of the L.C.C. has recommended that application be made to Parliament in the session of 1928 for authority to enlarge the tramway subway between Victoria Embankment and Southampton Row, so as to accommodate double-deck cars. The scheme includes the lowering of the floor of the subway and widening the centre platforms at Aldwych and Kingsway tramway stations. The cost of the work, including a nominal sum in respect of property, is estimated at £250,100, plus an additional £76,400 for converting 50 single-deck cars to the double-deck type, making the total estimated cost of the scheme £326,500. The time required for the execution of the work is estimated at from 12 to 18 months.

STORM FLOODS.—The storm which broke over London on July 11th disorganised the traffic on the District Railway owing to flooding between St. James' Park station and Hammersmith. There were also interruptions in the service between Putney Bridge and Earl's Court, and between South Kensington and Earl's Court, as a result of which three of the intermediate stations were closed. A normal service was restored on the District section of the Underground Railway between St. James' Park and West Brompton by 10.30 p.m., and all the Underground services were working normally by 11 p.m., and stations were reopened.

BREAKDOWN.—A breakdown occurred on the underground railways on July 7th, and the Underground Railway Company has issued a statement to the effect that one of the h.p. cables connecting Lots Road power station and Wood Lane power station fused. This affected some of the sub-stations on the Underground system and there was consequently an interruption of the train services. Trains on the District Railway, Piccadilly and Hampstead lines were temporarily brought to a standstill. Traffic on the Central London Railway and Bakerloo lines was only slightly delayed. The trouble was remedied in a few minutes, and with the current supply improving rapidly full normal working was resumed

within half an hour on all lines. There was no breakdown at the Lots Road power station. Full normal pressure was available throughout.

Liverpool.—YEAR'S WORKING.—We have received from Mr. P. Priestley, general manager of the Corporation tramway undertaking, a copy of his report, together with the accounts of the undertaking for the year ended March 31st last. The total revenue amounted to £1,436,805, and working expenses were £1,178,224, leaving a gross profit of £258,582. The figures for the preceding year were:—Income, £1,434,597; working expenses, £1,154,183; gross profit, £280,414. Interest and sinking fund charges absorbed £101,139, leaving a net surplus of £157,443, of which £75,000 was contributed to the city rates, and the remainder transferred to reserve, renewal and depreciation fund. The previous year's working resulted in a surplus of £178,146. The capital expenditure during the year amounted to £306,530, and included £152,835 for lands, buildings, and fixtures, £70,186 for cars, and £60,485 for permanent way reconstruction. The total capital now expended on the undertaking stands at £3,146,598. The number of passengers carried increased from 247,168,008 to 247,608,127, and the car miles run from 17,368,887 to 17,495,967. The revenue per car-mile decreased from 19.123d. to 19.055d. During the year 48 new cars were put into service and approximately 17 miles of trolley wire was renewed. The extension of the tramway track in Walton Hall Avenue and Mill Street was completed and opened for traffic, and a commencement was made with the Gt. Crosshall Street extension.

Southern Railway Electrification.—*The Times* reports that the Southern Railway will complete the electrification of its suburban lines next year at a cost of about £11,000,000, and although no decision has yet been arrived at, consideration is being given to the electrification of the line to Brighton. It is thought likely that this may be undertaken and even completed within the next five years.

South Shields.—YEAR'S WORKING.—The report of the general manager and engineer of the Corporation tramway undertaking (Mr. J. Austin Baker) for the year ended March 31st last shows a total income of £65,112, and expenditure of £48,100, leaving a gross profit of £17,013. The figures for the preceding year were:—Income, £84,531; working expenses, £62,535; gross profit, £21,996. To the gross profit was added revenue from other sources, making a total of £19,012. After deducting capital charges, making contributions to the sinking fund, and repayment of mortgage loans, there was a net surplus of £820. There was, however, a deficit of £3,175 on the motor-omnibus service, and the final result therefore was a deficit of £2,355. The number of passengers carried decreased from 17,772,520 to 14,273,993 ('buses 880,891), and the car miles run from 1,243,062 to 1,126,585 ('buses 206,510). The average traffic revenue per car mile fell from 17.8143d. to 16.7353d.

Telegraph and Telephone Notes.

Canada.—POPULARISING THE TELEPHONE.—Not long ago the British Postmaster-General, the Rt. Hon. Sir Wm. Mitchell-Thomson, Bart., stated that one additional call per line, per day, by every existing telephone subscriber would, in a year, produce additional revenue to the extent of nearly two and a quarter million pounds. The problem facing those who have set out to popularise the telephone in Great Britain is how to bring about such a desirable increase in the public use of the telephone, and the annual report on the Manitoba Government service throws light on this question: There have been continued improvements during the last few years, which, it is said, evidences the fact that the system has reached a stage where it may be considered on a permanent self-supporting basis. From 1922 surpluses have been earned, which in 1926 reached £41,765. The total revenue for that year amounted to £685,064, an increase of £28,269 over 1925. However, fixed costs, depreciation and interest were £294,620, against £279,220, an increase of £15,400, and, while current expenditure increased by £1,659, it is evident that had large economies not been effected since 1922, the present satisfactory condition, from a financial viewpoint, would have been impossible. The total savings in maintenance and operation costs from 1922 to 1926 were £117,402. In 1921 controllable costs amounted to £465,997, falling to £348,390 in 1926. The net surplus after deducting all costs for the year totalled £41,765. The largest expenditure of the year was in connection with the conversion of two remaining manual exchanges in Winnipeg to automatic operation. The total amount spent in the city was £61,415, while £24,100 was expended throughout the rest of the province. Winnipeg is the first large city in Canada to have complete automatic service and an interesting consequent effect is the increase in the number of conversations; comparing the previous manual system with the present full automatic one, it was necessary to increase switching facilities for an equal amount of lines by over 20 per cent., which means that amount of automatic telephone conversation over that manually handled. "There is great economy in the elimination of operating costs, representing a saving of £1 10s. 10d. per line," says Mr. J. E. Lowry, commissioner of the Manitoba system, "or approximately £51,427 per year on an equivalent amount of lines manually operated, taking all charges into consideration." From 1922 to 1927, the net surplus multiplied seven times; economies and improved methods of operation saved over £102,854, and the gross improvement since 1921, which showed a deficit of £110,761, approximated £154,281. Communication was opened up to 57 new districts, and another result was that, while the plant value increased by 20 per cent., the number of employés decreased by 45 per cent. It will be noted that the introduction of automatic telephony had the effect of increasing the use of the telephone by over 20 per cent., the system which has brought about this gratifying result being the well-known "Strowger."

Portuguese East Africa.—COMMUNICATION.—In a Department of Overseas Trade report on the economic and financial condition of Mozambique it is pointed out that the province forms part of the South African Postal Union and communication is regular. In the district of Lourenço Marques there are over 600 telephones; telephones also exist at Beira and most of the coast towns, as well as on the estates of the large agricultural companies and the railways. Telegraph lines belong to the State, the chartered companies, the cable companies, and private concessionnaires: 14,000 miles of line exist, of which about 7,500 miles belong to the State and 3,750 miles to British enterprises: over 1,000 miles are within the territory of the Mozambique Company, and nearly 250 miles belong to the Niassa Company. Wireless stations exist at Lourenço Marques, Inhambane, Beira, Quelimane, and Mossuril, near the Island of Mozambique: they are equipped with plant used during the war, either by the Portuguese forces or seized on German ships, and are used for the provincial service and for communication with shipping (official and private). In addition, a standard 6-kW Marconi station has been completed at Lourenço Marques, and a 1.5-kW station at Beira; they are being used for communication with the other provincial stations and similar stations are to be erected at Tete and Mozambique, to be followed later by subsidiaries at Chai-Chai, Porto Amelia, and other points of importance Marconi's Company has erected at Lourenço Marques, for the Companhia Portuguesa Radio-Marconi, a "beam" station for communicating with Lisbon and the other colonies. The concession of the Portuguese company is for forty years, and similar stations are planned for Madeira, the Azores, Cape Verde and Angola.

Sweden.—UNDERGROUND TELEPHONE CABLES.—The substitution of underground cables for overhead wires in Sweden's telephone system continues. The cable laid some years ago between Stockholm and Gothenburg has been a complete success and the frequent interruptions which formally occurred on the line, especially in winter, have now been practically eliminated. The cost of the cables is well counterbalanced by the reduction of the cost of repairs to overhead lines. Another cable, 185 kilometres long, is now being laid between Stockholm and Gaefle, and the cable to Norrkoeping will probably soon be extended to Malmoe, thus rendering the chief trunk lines independent of bad weather.—*Reuter's Trade Service* (Stockholm).

United States.—TELEPHONE ADVERTISING PAYS.—The value of a policy of persistent advertisement is demonstrated by the latest estimates of the American Bell Telephone Company's Statistical Bureau, which show that whereas 17,746,168 telephones were in service on January 1st, the increase in the first five months of the year pushed the total well over eighteen millions. In this country, with considerably more than one-third the population, but with practically no advertisement of the service, 1,477,000 telephones were in use on January 1st and at the end of May 1st the number was 531,868. The Bureau reports that there are 9,677 large and small telephone companies operating 20,032 exchanges throughout the country. The estimates place the total investment in telephone plant and equipment in the United States at 3,400,000,000 dollars.

Radio Notes.

Czecho-Slovakia. — BROADCASTING FINANCE.—The balance sheet of the Czecho-Slovakia broadcasting organisation, which had 215,000 subscribers in 1926, shows receipts amounting to 7½ million crowns (£46,000) and an expenditure of 5½ millions (£33,500).—*Reuter* (Prague).

Wireless for All.—NEWPORT'S VENTURE.—Wireless masts, aerials, leads, and even earthing switches are "fixtures" of every one of the 300 houses which have been erected by subsidised private enterprise in Newport's newest suburb at Malpas at a rent of 16s. 6d. per week, inclusive of rates, says the *Western Mail*. The building company which owns the estate has provided the masts and aerials in order that they shall be erected in a uniform manner.

Contract Information.

When "Contracts Open" are advertised in our "Official Notice" pages, the date of the ELECTRICAL REVIEW containing the advertisement is given in parentheses below.

Contracts Open.

Acton.—July 18th. Town Council. One vertical two-crank non-compound engine, with 50-kW generator, &c., for the destructor works. (July 8th.)

Australia.—MELBOURNE.—November 14th. State Electricity Commission of Victoria. Two 10,000-kW back-pressure turbo-generators and accessory plant. (July 1st.) One 40-ton electrically-operated travelling crane.

November 21st. Five centrifugal feed pumps.

November 28th. Four h.p. water-tube boilers and accessory plant and steel work for buildings.

November 14th. One 40-ton single-crab, 3-motor type electrically operated travelling crane. (See this issue.)

Eight tubular steam coal driers; seven electrically-operated briquette presses; central waste coal dust collecting system. (A.X. 4911.)

Dartford.—July 18th. Electricity Department. Small steam coal for 6 months. (July 8th.)

Edinburgh.—August 22nd. Electricity Supply Department. H.p. and l.p. steam and water pipes, circulating-water pipes, flue dust extraction plant, h.p. steam and water valves, and l.p. water valves. (See this issue.)

Erith.—July 20th. Electricity Department. Three 50-kVA transformers. (July 8th.)

Fort William.—July 23rd. Electric lighting installation at Station Hotel, Mallaig. Schedule from Mr. G. MacRitchie, architect, Fort William.

Glasgow.—July 22nd. Corporation. Electric lighting installation in connection with the erection of buildings between London Street and Gallowgate. Schedule from town clerk.

Heston and Isleworth.—July 25th. Electricity Department. Remote controlled converting plant, h.p. switchgear, transformer, and h.p. "H" type cable and pilot cable. (See this issue.)

India.—July 22nd. South Indian Railway Co., Ltd. Electric overhead travelling cranes, electric walking cranes. Specifications from the company's offices, 91, Petty France, Westminster, S.W.

London.—KENSINGTON.—July 21st. Board of Guardians. Installation of new power mains for X-ray and electro-medical work at St. Mary Abbots Hospital. (July 8th.)

ISLINGTON.—July 26th. Cleansing Committee. New lead battery for an Edison 3½-4 ton vehicle. (See this issue.)

H.M. OFFICE OF WORKS.—July 28th. Supplying and laying cable and ducts, &c., at the National Physical Laboratory. (See this issue.)

Lossiemouth.—August 6th. Town Council. Electric lighting installation of four blocks of flatted houses. Schedules, &c., from Mr. A. G. D. Grant, burgh surveyor.

Liverpool.—The Tramways and Electric Lighting and Power Committee is inviting tenders for e.h.p. and l.p. switchgear.

Lurgan.—July 25th. Urban District Council. One vertical cold-starting oil engine and direct-coupled alternator of 130-kW capacity. (See this issue.)

Manchester.—July 19th. Waterworks Department. One electrically-driven air compressor, transformer, pipes, valves, wiring, &c.; six 200-b.h.p. d.c. electric motors, speed reduction gears, cables, wiring, &c. Specifications from the Waterworks Engineer, Town Hall, Manchester.

New Zealand.—WELLINGTON.—September 13th. Public Works Department. Two sets 110-kV outdoor switchgear for the Waikato electric power scheme. (BX. 3579.)*

October 4th. Batteries and charging sets for Mangahao electric power scheme. (B.X. 3580.)*

September 27th. One 15-ton electrically-operated overhead travelling crane. (A.X. 4849.)

October 4th. 50-kV lightning arrestors for Waikaremoana. (B.X. 3603.) 11,000-V switchgear and metering equipment. (B.X. 3602.) 50-kV lightning arrestors for Waikato. (B.X. 3605.)

October 25th. 10,000-kVA transformers for Waikato. (B.X. 3604.)

Shitlington, West Riding.—July 19th. West Riding Education Committee. Electrical installation for the Middlestown new school. Specifications, &c., from Education Department, County Hall, Wakefield.

Singapore.—July 25th. Municipal Commissioners. One 10,000-kW turbo-alternator and condensing plant. (June 24th.)

Uruguay.—MONTEVIDEO.—August 5th. State Electricity Works. 16,522 l.p. a.c. meters and spares. (B.X. 3596.)*

Warrington.—July 18th. Electricity Committee. Twelve months' supply of e.h.p. and l.p. paper and lead-covered cables. (July 1st.)

* Further particulars can be obtained at the Department of Overseas Trade (Inquiry Room), 35, Old Queen Street, S.W.1.

Contracts Closed.

Barrow.—Electricity Committee. Accepted:—
500-kVA transformer (£320).—Fuller Electrical & Mfg. Co., Ltd.
Three switch panels (£437).—Ferguson, Pailin & Co., Ltd.
Construction of overhead line (£971).—J. Collier & Co., Ltd.

Birkenhead.—Electricity Committee. Accepted:—
Nine miles of cable (£1,710).—W. T. Glover & Co., Ltd.

Birmingham.—Public Health Committee. Accepted:—
Installation of electric lighting at Yardley Road sanatorium.—Etna Lighting & Heating Co., Ltd.
Electric lighting installation at the "Holly Lodge" Hospital.—Walker & Co. (Smethwick).

Bristol.—Health Committee. Recommended:—
Installation of new inter-ward telephone service at Ham Green Hospital (£260).—Colston Electrical Co.

Buenos Aires.—GREAT SOUTHERN RAILWAY CO., LTD.
Two "John Thompson" water-tube boilers, complete with steam and water fittings, superheaters, oil burning equipment, pumps, steel chimney, pipework, &c.—John Thompson, Water Tube Boilers, Ltd.

Burnley.—Electricity Committee. Accepted:—
450 yards of cable (£167).—Standard Telephones & Cables, Ltd.

Colchester.—Town Council. Accepted:—
Wiring at the new electricity station (£2,365).—Truslove and Co.

Doncaster.—Town Council. Accepted:—
Conversion of the Bentley Road tramway to a railless vehicle system:—
Overhead work and feeders, and 8 double-deck four-wheeled railless vehicles.—Clough, Smith & Co., Ltd.
Two double-deck 6-wheeled railless vehicles.—R. Garrett and Sons, Ltd.

Glasgow.—Tramways Committee.
Steam and water drum for one of the boilers in Pinkston power station.—Babcock & Wilcox, Ltd. (Accepted.)
Special track work (manganese steel).—Edgar Allen & Co., Ltd., and Hadfields, Ltd. (Accepted.)

Hull.—Education Committee. Accepted:—
Electric light installation at Boulevard Secondary School (£871).—Miller & Garness, Hull.
Electrical apparatus.—Schall & Son, Ltd.

Electricity Committee.

Switchgear extensions—

General Electric Co., Ltd.	(Accepted.)	**£14,048**
English Electric Co., Ltd.		14,348
Bertram Thomas		14,371
A. Reyrolle & Co., Ltd.		14,371
Metropolitan-Vickers Electrical Co., Ltd.		14,778
Ferguson, Pailin, Ltd.		14,881
Switchgear & Cowans, Ltd.		15,834
Johnson & Phillips, Ltd.		16,188
Park Royal Engineering Co., Ltd.		17 176
British Thomson-Houston Co., Ltd.		17 325
Erskine, Heap & Co., Ltd.		17,666
Coq Switchgear Co.		Incomplete.

Steel coal bunker—

Heenan & Froude, Ltd. (Recommended.) ...	**£7,652**
Burton Constructional Engineering Co. ...	7,951
Dempster, Robert, & Sons, Ltd.	10,135
Babcock & Wilcox, Ltd.	10,910
Tees Side Bridge & Engineering Works, Ltd.	11,440
New Conveyor Co., Ltd.	12,431

Liverpool.—Tramways and Electric Power and Lighting Committee :—

Steam pipes for Lister Drive power station (£2,750).—Babcock & Wilcox, Ltd.

Tramway special track work (£2,598), Edgar Allen & Co., Ltd. (£2,990), Hadfields, Ltd.

Switchgear for protective transformers (£1,206).—Metropolitan-Vickers Electrical Co., Ltd.

City Council. Accepted :—

200 fire alarms and telephone boxes (£21,063).—Standard Telephones & Cables, Ltd.

London.—LONDON COUNTY COUNCIL.—Education Committee. Electric light installation for Holloway School, Islington :—

Electrical Installations, Ltd. (Recommended.)	**£568**
Alpha Manufacturing & Electrical Co., Ltd. ...	570
Smethurst & Co. (London), Ltd.	628
Anderson Angell & Co.	659
A. Dean & Co., Ltd.	675
A. Hawkins & Sons	690
Pinching & Walton	784
Bailey & Incledon, Ltd.	787
Berkeley Electrical Engineering Co., Ltd. ...	847
Heath-Pritchard, Ltd.	869
H. J. Cash & Co., Ltd.	966
W. H. Gaze & Sons, Ltd.	1,020

Electric light installation for Magdalen Road School, Wandsworth :—

A. Dean & Co., Ltd. (Recommended.)	**£239**
H. J. Cash & Co., Ltd.	248
Berkeley Electrical Engineering Co., Ltd. ...	292
Bailey & Incledon	297
W. H. Gaze & Sons, Ltd.	352
Malcolm & Allan, Ltd.	381

Electric light installation for secondary school at Red Lion Lane, Woolwich :—

Smethurst & Co. (London), Ltd. (Recommended.)	**£946**
Alpha Manufacturing and Electrical Co., Ltd. ...	950
Electrical Installations, Ltd.	984
H. J. Cash & Co., Ltd.	998
Anderson, Angell & Co.	1,034
A. Hawkins & Sons	1,049
A. Dean & Co., Ltd.	1,049
Woolwich Borough Council	1,161
Bailey & Incledon, Ltd.	1,215
Pinching & Walton	1,287
Heath-Pritchard, Ltd.	1,400
Berkeley Electrical Engineering Co.	1,405

Electric light installation for Sirdar Road School, Kensington :—

Bailey & Incledon, Ltd. (Accepted.)	**£590**
Alpha Manufacturing & Electrical Co., Ltd. ...	660
A. Dean & Co., Ltd.	723
L. G. Tate & Co., Ltd.	725
Anderson, Angell & Co.	747
Bovis, Ltd.	747
Pinching & Walton	878
Berkeley Electrical Engineering Co., Ltd.	933
W. H. Gaze & Sons, Ltd.	971

Electric light installation for Prichards Road School, Bethnal Green :—

Anderson, Angell & Co. (Accepted.)	**£163**
A. Hawkins & Sons	174
Burden & Co., Ltd.	190
Buchanan & Curwen	194
H. J. Cash & Co., Ltd.	220

Electric light installation for secondary school at Du Cane Road, Hammersmith :—

A. Hawkins & Sons. (Accepted.)	**£919**
Electrical Installations, Ltd.	920
Smethurst & Co. (London), Ltd.	931
Alpha Manufacturing & Electrical Co., Ltd. ...	965
Anderson, Angell & Co.	994
A. Dean & Co., Ltd.	1,064
H. J. Cash & Co., Ltd.	1,086
Bailey & Incledon, Ltd.	1,098
W. H. Gaze & Sons, Ltd.	1,159
Pinching & Walton	1,247
Heath-Pritchard, Ltd.	1,311
Berkeley Electrical Engineering Co., Ltd. ...	1,324

ST. PANCRAS.—Electricity Committee. Recommended :—

Cable.—(£465) Standard Telephones & Cables, Ltd.; (£2,071) Hackbridge Cable Co., Ltd.

Leyland.—Urban Council. Accepted:—

Installing electric light in the public hall (£150).—Mr. P. H. Heyes.

Maidenhead.—Town Council. Accepted:—

Replating the negative side half battery at the electricity works at £763.—D.P. Battery Co., Ltd.

Maidstone.—Town Council Accepted:—

Transformers (£278).—Johnson & Phillips, Ltd.

Manchester.—Electricity Department. Accepted:—

L.p. circulating-water valves for Barton station.—Glenfield and Kennedy, Ltd.

Two motor-driven boiler feed pumps.—Mather & Platt, Ltd.

Steam-turbine driven boiler feed pump.—G. & J. Weir, Ltd.

33,000-V feeder equipment, Oldham Road sub-station.—A. Reyrolle & Co., Ltd.

Weldless steel, spigot, and faucet tubes for street lighting extensions.—Bromford Tube Co., Ltd., and British Mannesman Tube Co., Ltd.

Battery for 3½-ton electric wagon.—D.P. Battery Co., Ltd.; ditto for 1-ton electric lorry.—Tudor Accumulator Co., Ltd.

Seven 250-kVA transformers.—Bruce Peebles & Co., Ltd.

12 l.p. feeder panels.—General Electric Co., Ltd.

Annual stores :—

Lanterns.—Wardle Engineering Co., Ltd., Engineering and Lighting Equipment Co., Ltd., and Cable Accessories Co., Ltd.

Potential and current transformers.—Ferranti, Ltd.

Weldless-steel lamp columns and fittings.—Bromford Tube Co. and British Mannesman Tube Co., Ltd.

Meters.—Measurement, Ltd.; Edison Swan Electric Co., Ltd.; Ferranti, Ltd.; Chamberlain & Hookham, Ltd.; Aron Electricity Meter, Ltd.; Thompson & Co.; Landis and Gyr, Ltd.; Metropolitan Vickers Electrical Co., Ltd.

Electric kettles.—Premier Electric Heaters, Ltd.

New Zealand.—Government Railway Department. Accepted :—

120 electric hoist blocks.—Paterson & Hughes.

Seven 2-ton travelling cranes.—Clyde Crane & Engineering Works.

Two 25-ton travelling cranes.—Craven Brothers.

Four 100-ton travelling cranes.—Sir William Arrol and Company.

Four electric mobile cranes.—Ransomes, Sims & Jefferies, Ltd. —*Reuter* (Wellington).

Oldham.—Electricity Committee. Accepted:—

L.p. cable.—Union Cable Co., Ltd.

Earthenware cable ducts.—Albion Clay Co., Ltd.

Sleaford.—Electricity Committee. Recommended:—

Boxes, fibre-insulated cable, &c. (£434).—Callender's Cable and Construction Co., Ltd.

Taf Fechan.—Water Board. Accepted :—

Electric lighting installation at valve tower and engineer's house (£153).—J. B .Saunders, Ltd. (Cardiff).

Weardale.—The British Thomson-Houston Co., Ltd., has received a six months' contract for the supply of "Mazda" lamps from the Weardale Steel, Coal & Coke Co., Ltd.

Wimbledon.—Electricity Committee. Recommended:—

3,000-kW turbo-alternator, condensing plant, and accessories (£16,385).—Metropolitan-Vickers Electrical Co., Ltd.

Whitby.—Urban Council. Accepted:—

New plant for the electricity work (£7,525).—Brush Electrical Engineering Co., Ltd.

The "Electrical Review" Service Department.

INQUIRIES must be accompanied by a stamped addressed envelope.

We should be glad to learn the names and addresses of makers of the following :—

PARAGON plate washing machine.

KINGOLITE accumulator hand lamps.

STEATITE rollers for the operation of small switches.

HYDRA magnetos.

ULTION immersion heater.

Notes.

Penetration of Radio Waves.

Messrs. A. S. Eve and D. A. Keys, both of the Bureau of Mines, Washington, U.S.A., point out in *Nature* that singularly little seems to be known about the extent to which radio waves will penetrate into the ground, yet information on this point has become quite desirable inasmuch as there are now two or three geophysical methods of prospecting which definitely attempt to use radio waves for the detection of ore beneath the earth. Experiments in a mile-long tunnel at Montreal have indicated clearly that 40-metre waves could not be detected, at either end, when only a few hundred feet within the tunnel. Broadcasting waves (400 m.) appeared to be better and were detected, with the help of good amplification, throughout the tunnel under an overload of 700 ft. of limestone and igneous rocks. Longer waves (10,000 m.) were detected yet more readily, but it remained uncertain whether these waves came into the tunnel through the air, or along the rails and electric wires, or whether they came through the rock. The only sure thing is that the 40-metre waves did not penetrate to the centre of the tunnel by any of these means. Experiments by the U.S. Bureau of Mines at a mine near Pittsburgh indicate similar results, and experiments with submerged submarines prove that radio waves will not pass more than about 50 or 60 feet into sea water, no matter what the wave-length, but penetration into fresh water, damp rock, and dry rock remains uncertain. They express the hope that some wireless enthusiasts may have the opportunity of making experiments underground in cave, tunnel, or mine which is absolutely devoid of wires or other conductors, and where the windings from the entrance are sufficiently devious to preclude the passage of waves through air down to the receiving apparatus consisting of coil, amplifier, and receiver only. Accurate measures of signal intensity would be still more valuable.

Electricity in Agriculture.

It is interesting to note that the East Anglian Electric Supply Co., Ltd., which has in the past developed the supply of electricity in its rural areas, and is now seeking powers to extend its operations, has induced Dr. Alfred Ekström to give a series of lectures on the subject in East Anglia, during this week, at Ipswich, Bury St. Edmunds, and Sudbury. The company is to be congratulated on its enlightened policy, and on its good fortune in enlisting the services of so popular and expert a lecturer as Dr. Ekström.

A Large Electric Sign.

The accompanying illustration shows a large electric sign which has been erected in Melbourne for advertising "Aspro" products. It is three-sided and the letters are 10 ft. high and 20 in. wide. 3,540 Osram sign-type lamps are installed on the sign, 136 being the average number used for each letter. About 3,000 of the lamps are of the clear type, the balance

A Large Electric Sign.

being red colour-sprayed. The sign is positioned 60 ft. above the 70-ft. building to which it is attached. The structure contains over 30 tons of material and was designed for a wind pressure of 40 lb. per sq. ft., equivalent to a gale force of 70 m.p.h., by Messrs. O. J. Nilson & Co., in conjunction with Messrs. Harry Norris, architects. Some 17 miles of cable was used, which, with the lamps, was supplied by the British General Electric Co., Ltd., of Melbourne.

Electric Bells and Relays in Mines.

The attention of the Secretary for Mines has been drawn to existing misapprehension as to the scope of the type of tests of electric bells and relays which, on application by manufacturers, are carried out at the Mines Department testing station. He, therefore, states that the object of these tests is to determine whether a particular type of bell or relay is safe in the sense that the break flash (whether at the instrument or on the bare wire lines) is incapable of igniting an explosive mixture of firedamp and air, when the source of current is at the maximum pressure permissible for underground signalling, *viz.*, 25 volts. *These tests are carried out with a single bell or relay in the circuit*, and the certificate of safety which is issued if the instrument passes the tests is subject to this limitation. In particular, the certificate does not hold good if two or more bells or relays are connected in parallel in the bare wire circuit. Under such conditions the break flash at the bare signal wires is likely to be dangerous, and in any case the margin of safety will be greatly reduced. A different form of circuit, such as will readily suggest itself, should be adopted in such cases.

Late Legal.

MARCONIPHONE, LTD., & REDUCED.—The petition for the reduction of this company's capital by writing off £360,000 came before Mr. Justice Eve in the Chancery Division on Tuesday last.

Mr. Jenkins, K.C., for the petitioners, said that the loss was principally due to the company's participation in the Poulsen-Petersen radio-telegraph system. Since 1925 the company had reduced its losses from £600,000 to £360,000, and it now desired to put its balance sheet in order before attempting to pay any dividend which it hoped to be in a position to do.

Mr. Justice Eve said that he would require evidence regarding the parties to the agreements in connection with the Poulsen-Petersen system, &c., and adjourned the hearing until July 21st.

The Shannon Scheme.

According to the *Irish Times*, good progress is being made with the weir which is being constructed at Parteen Villa, above Obriensbridge, to raise the water level 7.55 metres. There will be four sluices 18 m. wide and two 10 m. wide, closed by steel gates which are to be worked electrically or by hand. The weir is being built between coffer dams, in three sections, of which the first is under construction. The intake will have three 25-metre openings and a boat passage 10 m. wide, all of which can be closed with steel sluice-gates. A culvert capable of carrying 10 cu. m. per second is being provided to conduct the Black River and water from the drainage trenches into the Shannon below the weir; part of the culvert has been completed. Banks will be raised to protect the adjoining land above the weir from floods, and the streams which formerly flowed into the Shannon will be led along trenches behind the banks into the tail water.

After the reading of a paper by Prof. Rishworth, chief engineer of the Power Section, Department of Industry and Commerce, on the Shannon works at a Technical Congress at Galway, Mr. J. F. King, M.I.M.E., principal of the Cork Technical Institute, is reported by the *Cork Examiner* to have said that the Shannon scheme would create a demand for electrical engineers and skilled workers, which should be met, respectively, by extending the facilities for teaching electrical engineering and by setting up elementary classes in the smaller technical schools. The uses of electricity in the home should be demonstrated at domestic science classes, additional equipment being installed for the purpose. Whilst it was hoped that cheap power would lead to the establishment of new industries, the first need was to convert existing plant to electrical operation. Lectures on and demonstrations of the uses of electric power on the farm, in the creamery, and in the home, should be given by travelling experts; the people ought to be convinced that it was not necessary to be an electrical engineer in order to make use of electrical energy. Many of the present-day farmers were still in the "candle stage"; clever and intensive propaganda would be necessary to induce the people to adopt electricity. Professor F. S. Rishworth stated that monthly shifts were being worked all through the summer, and that it was expected the output during the coming months would almost reach the peak for this, the middle, or main, constructional period. From the progress of the work up to date, from the plant assembled, and the transport facilities now available, it was believed that the weir gates at Parteen could be closed down and the water allowed to enter the canal slowly in the spring of 1929.

The F.B.I. and the Electricity (Supply) Act, 1926.

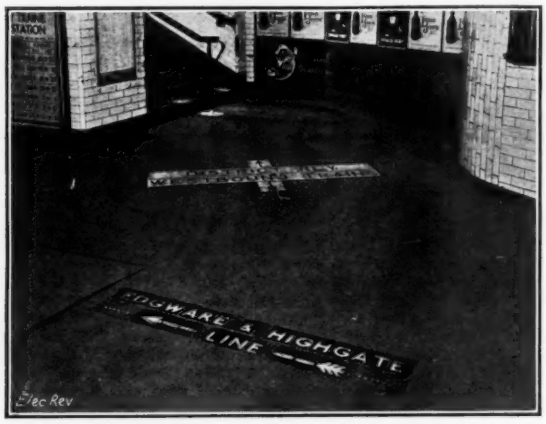
In Vol. VI of the *Fuel Economy Review* of the Federation of British Industries, which was recently issued, an editorial on political movements discusses the Electricity (Supply) Act, 1926, which, it is pointed out, was strongly denounced by many whose opinions were entitled to full consideration, and can only escape the reproach of further hampering the electricity supply industry by cheapening the cost and increasing the availability of electric power. The hope is expressed that in future power problems will be divorced from party politics, lest tragedy result.

An editorial article on the Act elaborates the topic, regarding the Act with apprehension, which is relieved only by the happy choice of Sir Andrew Duncan as the chairman of the Board. The fact that the two schemes first taken in hand (Central Scotland and the Midlands) relate to areas of large consumption and small dimensions is commented on; these districts are already equipped with highly efficient generating stations, and interconnection can be effected at minimum cost—but will the supply of electricity be cheapened? or will

the backward areas supplied from the more advanced ones alone reap the benefit? The *Fuel Economy Review* holds that the centres where the load is high and the supply low-priced must not become milch cows for the profit of the districts where at present the load is small and the price high. As for rural electricity supply for agricultural purposes, the *Review* doubts whether it will be realised until the railways are electrified.

Sign Trials at Charing Cross.

Passengers using the interchange subway at Charing Cross District Railway Station during the last few days have noticed an interesting form of traffic direction sign with which the Underground Company is making experiments. The sign consists of glass letters countersunk in the concrete floor beneath which lights have been fixed which cause the legend "To Edgware and Highgate Railway" to stand out conspicuously, as will be seen from the accompanying illustration.



An Illuminated Sign at Charing Cross.

The sign is one of several types which have been installed experimentally during the past few months. The other one shown in the picture is composed of black rubber letters inlaid in aluminium troughs which are, in turn, let into blocks of white rubber.

Appointments Vacant.

Showroom superintendent for borough of Lancaster electricity department; canvasser (£249) for the Hammersmith Corporation Electricity Department; engineer and manager (£500) for the Walton-on-Thames Urban District Council Electricity Department; borough electrical engineer (£1,100) for the Halifax Corporation Electricity Department. (See our advertisement pages to-day.)

Terrestrial Magnetism.

According to the Astronomer-Royal's report on the work of the Royal Observatory, Greenwich, the magnetic observations (now made at Abinger) show that for the year 1926 the declination was W. 13° 10.4′; horizontal force, 0.18581; vertical force, 0.42947; dip, 66° 36.2′.

Kilowatt v. Horse-power.

The anomaly of expressing the capacity of an hydraulic turbine in terms of horse-power, although the energy, when generated, is expressed and sold on the basis of an entirely different unit—the kilowatt—is engaging the attention of the American Engineering Standards Committee. The problem has been considered by a sectional committee of about 40 engineers prominent in the American hydro-electric industry, between them representing 28 organisations. Another question that is being considered by this committee relates to the best way of expressing the fluctuations in capacity of a water-power site caused by variations in stream flow. A 100,000-kilowatt steam plant may be operated at full capacity so long as coal or oil is fed under the boilers, but a 100,000-kilowatt hydro-electric plant will operate at full capacity only so long as there is sufficient water to drive the wheels. In some of the most modern stations the water supply is sufficient to operate the whole plant only during two months in the year. The committee has had to consider how best to present a picture of the effect of the variable quantity of stream flow on the capacity of the site. After giving these and many other questions consideration for over a year, the committee has tentatively decided that the kilowatt should be used instead of the horse-power as the unit for expressing the capacity of water-power sites; that the capacity shown should express the theoretical potential power without deductions for the losses that occur in water-wheels, generators, transformers, &c., and that the capacity should be stated for two rates of flow—one called the 30 per-cent.-of-time flow, corresponding to a flow available 90 per cent. of the time, and the other called the 50 per-cent.-of-time flow, corresponding to the flow available for one half of the time. Everyone interested in hydraulic development in the United States has been invited to discuss these proposals freely, in order that, as eventually modified, they may represent the best American opinion. Other countries are also to be invited to become interested in the question—through the medium of the International Electrotechnical Commission—and the hope is expressed that the standards adopted may become international, if possible.

Wireless Alarms.

An interesting development of Messrs. Attaix, Ltd., Southampton, is a burglar alarm system by means of which a warning is given to one or a number of stations within a given radius. On the intrusion of the burglar a local battery brings into operation a small transmitter which works roughly on a wave-length of 600 to 800 metres; this in turn automatically operates a 5- or 6-valve receiving set at any point within a distance of 50 miles. A buzz from a small instrument at the transmitting end is reproduced by the receiving apparatus with an enormous volume through a loud-speaker, so giving the required warning. It is believed that no difficulty would be experienced in obtaining a licence for the transmitter, as the working wave-length would be outside the broadcast wave-band. Tests have shown, it is claimed, that in no way would the apparatus be susceptible to any other transmission. The receiving apparatus embodies a combination of the makers' "Isodyne" receiver and "Adaptolite" convertor. A special transmitter is used. The principle of this system was recently adopted in a French village where the volunteer fire brigade is called out by wireless. When a fire occurs the central fire station sends out a signal which brings instantly into operation all the sets installed in the houses of the volunteers, over a distance of 20 miles. Local relays installed in the firemen's premises are kept continually in circuit by a 3-W lamp; they are so adjusted that on a certain wave-length and at a particular note they release a local switch which brings the tuned wireless set into operation. The central fire station announces the place where the fire has broken out and then switches off. The relays are then replacd by hand.

A Large Lamp.

The American Westinghouse Co. has produced an incandescent electric lamp, the filament of which operates at a temperature of 4,940 degrees Fahrenheit. It was necessary to have special "pyrex" glass manufactured for this lamp, in order to obtain glass that would withstand the temperature, even when shielded by the inert pure nitrogen with which the bulb is filled. The lamp is rated at 10,000 watts, 115 volts, and 260,000 lumens, equivalent to 10 kW, or 13.3 electrical h.p.

Electrical Burglary Prevention.

According to the *Daily Telegraph*, an ingenious electrical device led to the abandonment of a robbery at the establishment of Messrs. J. Lyons & Co., Ltd., Powis Street, Woolwich, recently. Light being in the shop, showed a constable that a safe had been removed from its usual position. The safe was so arranged that when it was moved two lamps were automatically switched on. The thieves, unable to switch the lamps off, beat a hasty retreat.

Electroplaters' and Depositors' Technical Society.

A meeting of the Society was held on June 15th at the Northampton Polytechnic Institute, when Mr. E. Downs, M.Sc., A.I.C., read a paper on "Electrolytic Refining." Mr. W. A. C. Newman occupied the chair.

Mr. Downs said that of the three methods available for refining silver, *viz.*, the metallurgical, chemical, and electrolytic, the last-named was finding increasing favour on account of the relative ease with which it was possible to obtain a product of high purity. The purity could be as high as 99.98 per cent.

The earliest attempts at silver refining were made by Wohlwill in 1873, using an acid sulphate solution. This was abandoned in favour of the Moebius process introduced in 1884, which, with only slight modifications, was used at present. The electrolyte consisted of copper and silver nitrates and nitric acid. The material usually refined consisted of *dore* silver having a very high silver content; gold and silver alloys from various sources, *e.g.*, jewellers' residue and scrap composed of 2-30 per cent. gold, 60-90 per cent. silver, and 15-20 per cent. copper and base metals; and silver and copper alloys used for coinage and in the jewellery trade, containing 70-92½ per cent. silver. The main impurities comprised lead, bismuth, platinum metals, tellurium, selenium, and zinc. The impurities which were insoluble remained in the anode slimes or might be precipitated at the anode as basic compounds, *e.g.*, lead peroxide; silver occurred as the oxynitrate compound, and to a lesser extent copper. To prevent the solution of bismuth and tellurium, the electrolyte must be kept neutral. Copper, being nearest to silver in the electrochemical series, had the greatest tendency to co-deposit with the silver. To ensure that this should not occur, the solution was kept rich in silver ions and the copper ion concentration was kept within limits by periodic withdrawal of the electrolyte and addition of silver solution, and efficient circulation of the electrolyte was ensured to prevent polarisation.

The two cells in general use, the Moebius or vertical cell and the Balbach or horizontal cell, were then described and

compared. The current efficiency in both types reached 95 per cent. The voltage required in the Balbach cell was twice as great as in the Moebius owing to the greater distance between the electrodes in the former case, and also the added resistance of the anode slimes. There was, however, very little difference in the cost of working.

Mr. D. McDonald, in opening the discussion, said that electrolysis was undoubtedly the best method of silver refining, not only on account of the purity of the product, but also because of the completeness of the recovery. The chief source of refinable material was not now the ore, but the by-products of the electrolytic industries, *e.g.*, those producing lead and zinc. The physical nature of the product presented an interesting field for research—it varied so much. Nitrates possibly had a similar effect to selenium. Again, the anode slimes would be worth investigation—their constitution was little known. How was it, too, that finely divided silver found its way into the deposit?

Mr. McNaughton referred to the hardness of the deposit and wished to know whether the hardness number had been determined. It would be interesting if this could be linked up with the hardness of electro-deposited nickel and chromium. An increase of temperature would be expected to give a soft deposit.

Mr. Ollard wished to know whether an arrangement for incorporating a moving cathode could be utilised. He gave details of a revolving disk cathode from which the deposit could be scraped off.

Mr. Gardam asked if mercury present as an amalgam would not be troublesome. He said that the electrolytic process had completely replaced smelting in some cases; in one case, the chain from the ore to the finished product was entirely electrochemical.

Mr. Wernick said it was somewhat surprising to find that colloids had not been used until latterly in order to reduce the crystal size of the deposit.

The chairman then gave some very interesting information on the Cleave refining process, which he had carried out at Ottawa, where a very high output had been achieved.

Copies of the paper may be obtained from the acting hon. secretary, 3, Bridge Street, London, E.3. The next meeting will open the new session in October.

Institution of Electrical Engineers.

STUDENTS' PREMIUMS.—The Council of the Institution has made the following awards of students' premiums for papers read before the Students' Sections during the 1926-27 session :—

Premiums of the value of £10 each to W. A. Cook, B.Sc., J. Eccles, B.Sc.(Eng.), F. I. Ray, and to J. A. Sumner.

Premiums of the value of £5 each to G. P. Barnard, S. B. Jackson, S. N. Ray, M.Sc., and to D. H. Wills.

Accurate Time-keepers.

The Astronomer-Royal's report, quoted in *Nature*, states that two standard sidereal clocks (Shortt Nos. 3 and 11) have been in use since last July; during the last 50 days their rates have been nearly coincident, and the clocks have never differed by more than 0.05 sec. A mean-time clock of the Shortt type has been ordered, which will be used for the distribution of radio time-signals through the Rugby station. Rhythmic signals will be sent at 10 h. and 18 h.

Electricity Supply Rifle League.

The following are the results of the recent matches :—1st Division : Central A 581, City A 581; Central A 574, Shoreditch 558; City A 574, Shoreditch 560; County 558, Shoreditch 553. The Central A team heads the list with 3 points. 2nd Division : B & K 565, City B 556; B & K 570, St. James' 564; Central B 555, City B 554; K & K 546, Central B 544; St. James' 559, Central B 555; City B 557, K & K 547; St. James' 575, City B 554; St. James' 561, K & K 541. The St. James' team heads the list with 6 points.

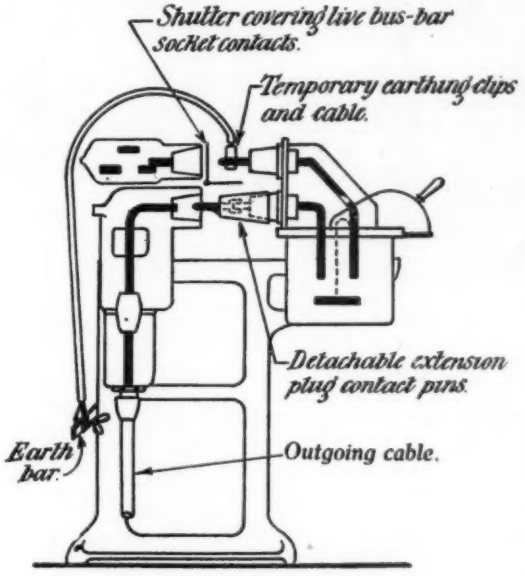
The Bureau of Standards Yearbook.

A new departure has been made by the National Bureau of Standards, U.S.A., in the shape of the "Standards Yearbook," which represents an effort to present an adequate picture of the standardisation movement which has spread throughout the world. The first issue contains outlines of the activities and accomplishments not only of the Bureau and other agencies of the Federal Government, and the States and municipalities, but also of the American societies and associations of which standardisation is a major activity. Descriptions and illustrations are presented of all the fundamental national standards of the United States; in addition, outlines are given of the various foreign national and the several international standardising agencies.

In a general review of the standardisation movement in America attention is directed to the remarkable growth in the activities of the trade associations, the development of "mass-production" methods of factory production, and the interest now being shown in standardisation by industrial executives. Besides informing the manufacturer of the current standardisation movements affecting his industry, the Standards Yearbook will inform purchasing agents of new standard specifications, being supplementary to the National Directory of Commodity Specifications in this respect, and will inform the scientist engaged in research as to current research projects which may lead to standardisation. To the average reader it is a mine of information on the present status and trend of standardisation in all fields of industry, commerce, science, and Government, with references to sources of further information. The Standards Yearbook is being issued as Bureau of Standards Miscellaneous Publication No. 77, and can be obtained from the Superintendent of Documents, Government Printing Office, Washington, D.C., at $1.00 per copy.

Mining-Circuits Earthing Device.

The accompanying illustration depicts an arrangement which is suggested by the Mines Department for temporarily earthing mine installation cables when they are being handled. The arrangement applies to switchgear of the draw-out type. The principle advocated is that the circuit shall be earthed through the circuit breaker so that if by any mischance the circuit is alive from the distant end the operation described is merely the equivalent of a short-circuit on the line, and the breaker will trip without danger to the operator if it is adequate for dealing with the fault. Where switchgear of the draw-out type is installed, detachable extension contact pieces are plugged on to, and thus lengthen, the terminals of the circuit breaker after withdrawal from the pedestal


Shutter covering live bus-bar socket contacts.
Temporary earthing clips and cable.
Detachable extension plug contact pins.
Earth bar.
Outgoing cable.

A Mining-Circuit Earthing Device.

base. An earthing clip is attached to the other or bus-bar terminals of the circuit breaker, which is then pushed back until the circuit contacts engage with the base. The circuit is then put to earth through the circuit breaker by switching on. In the case of fixed switchgear of the cubicle or panel type an isolating switch or link having a third position in which the circuit is put to earth should be introduced, it is suggested, between the circuit breaker and the source of supply. The above particulars and illustration, together with comment on and the actual wording of General Regulation 131, which requires that electrical conductors shall be discharged before they are handled, and so on, are contained in Mines Department Circular No. 23, dated June 24th, 1927, addressed to the owners, agents and managers of mines in which electricity is used.

Our Personal Column.

Electrical men are invited to enable us to keep readers of the "Electrical Review" posted concerning their movements

Mr. D. MAXWELL BUIST, A.M.I.E.E., chief assistant to Major H. Bell, O.B.E., T.D., M.I.E.E., city electrical engineer of Hull, has been appointed chief electrical engineer to Messrs. Synthetic Ammonia & Nitrates, Ltd. He took up his new duties on July 1st. Mr. Buist's engineering friends throughout the country and his Hull colleagues have presented him with a gentleman's wardrobe, a solid silver tea service, an entreé service, and a gold watch. Major Bell, who presided at the presentation, stated that Mr. Buist had left an indelible mark upon the Hull undertaking, and he expressed keen personal regret at losing one who had proved himself a loyal helper and a good friend. Mr. Benno Pearlman, chairman of the Electricity Committee, also spoke appreciatively of Mr. Buist.

The offer of the Hull Corporation Electricity Committee to increase the salary of Major H. BELL, the electrical engineer, to £1,500 per annum, provided he agreed to withdraw his application for the Belfast post, has been respectfully declined by the Major, and the Electricity Committee, it is reported in the local Press, has decided to take no further action in the matter. Major Bell stated several reasons for his action. First, he thought that the decision of the Committee might not be ratified by the City Council, and that it might "easily be subjected to a similar fate to that of the resolution of the Electricity Committee relating to the same matter" in January last. Another of his reasons was that the recommended figure differed materially from what he showed to be a fair figure for such an undertaking in his application of December last.

On the afternoon of July 7th the staff and employés of the Belfast Electricity Department met Mr. JOHNSTONE WRIGHT, the city electrical engineer, to congratulate him on his appointment with the Central Electricity Board and to present him with a gold cigarette case for himself and a gold wristlet watch for Mrs. WRIGHT. Messrs. Croft, Parker, Downey, and Holland voiced the staff's regret at Mr. Wright's impending departure. Mr. Wright replied, expressing his thanks to the staff for their valuable gifts and for their loyal service during his term of office.

The *Financial Times* records that Lord AMPTHILL has returned to England after his visit to South America in connection with a concession for the construction of underground railways in Buenos Aires.

Birmingham Corporation, on the recommendation of the Tramways Committee, has extended the service of Mr. A. C. BAKER, the tramway manager, for a further 12 months.

Mr. B. H. BINDER has been appointed chairman of the board of directors of the La Plata Electric Tramways Co. in place of Mr. W. Murray Wilson, resigned.

Mr. JOHN LEE, C.B.E., late controller, Central Telegraph Office, has joined the board of the Anglo-Portuguese Telephone Co., Ltd.

Mr. O. R. PARRY, chief electrical engineer of the Sneyd Collieries, who is leaving to take up an appointment with Messrs. Richard Cadman & Son, has been presented by the company with a gold wristlet watch and gold fountain pen and pencil, and by the staff of the transport department with a silver cigarette case.

At last week's meeting of the Bolton Town Council a resolution that the salary of the chief traffic assistant (Mr. C. ORMEROD) be increased from £500 to £550, rising by annual increments of £25 to £600 per annum, was referred back in order that a general standard of policy might be agreed upon.

Sir J. J. THOMSON, the well-known physicist and scientist, recently visited Paris in order to receive the Mascart medal awarded to him by the Société Française des Electriciens.

Last Saturday, Mr. HAROLD DICKINSON, city electrical engineer, Liverpool, received the honorary degree of Master of Engineering from the Liverpool University.

Word has been received of the marriage, in San Jose, California, of Mr. GEORGE COUPE, formerly of Blackburn, who holds a managing interest with one of the big electric corporations in California, and Miss HELEN MARGARET PETERSON.

Tilbury Urban Council has appointed Mr. F. A. LEE, of Newcastle, Staffs., as inspector of works in connection with the electricity scheme.

The Gas and Electricity Committee of the Malvern Urban Council has recommended that the salary of the gas manager and electrical engineer, Mr. E. D. WOOTTEN, be increased by £200 a year.

Mr. A. G. SNELL, late engineer and designer of Messrs. De la Rue & Co., Ltd., has now taken up his appointment with the firm of Messrs. H. E. Ashdown (Birmingham), Ltd., as works manager.

Modern Transport announces the approaching retirement (in September next) of Mr. W. J. THORROWGOOD, M.I.E.E., from the position of signal and telegraph superintendent in the Chief Engineer's Department of the Southern Railway. He has completed 50 years' service with the company. He is a past-president of the Institution of Railway Signal Engineers, and is a member of the Institute of Transport.

We note with pleasure that Mr. J. W. THOMAS, B.Sc., LL.B., A.M.I.E.E., assistant general secretary to the Electrical Power Engineers' Association, who on various occasions has contributed articles to our columns, has been called to the Bar.

Mr. E. P. BARFIELD, managing director of Automatic and Electric Furnaces, Ltd., has sailed for New York to give demonstrations of "Wild-Barfield" electric furnaces (already installed in American works) to a number of engineers and executives of the leading American engineering firms.

Obituary.—MR. A. H. COLLINSON.—Mr. Alfred Howe Collinson, C.B.E., M.Inst.C.E., died while travelling by train in the Punjab, on June 28th. He was 61 years of age. He had carried out many railway construction operations in different parts of the world during his career, and according to *The Times* he had in recent years represented the Foundation Company, Ltd., first in British East Africa and then in India. Further, he did valuable work in reorganising the Calcutta tramways on behalf of the London board.

HERR S. BERGMANN.—We regret to record that Herr Siegmund Bergmann, head of the Bergmann Electrical Company in Germany, died on July 7th at Berlin at the age of 75 years. A *Times* correspondent states that he was born in Thuringia, and at the age of 18 went to New York, where he became the assistant and later the partner of Mr. Thomas A. Edison, with whom he was associated in many electrical discoveries and developments. "In a factory which Herr Bergmann started in the United States, Mr. Edison had a laboratory, and the concern later formed a part of the Edison Electrical Company. Later Herr Bergmann established two electrical companies in Berlin, which in 1900 were combined under the title of the Bergmann Electrical Works. Of this company he was general director until his death."

MR. G. F. PICKETT.—The death occurred suddenly, on June 25th, at the age of 39 years, of Mr. George F. Pickett, electrical engineer, Bexley Heath.

LADY RENWICK.—We desire to express our sympathy with Sir Harry Renwick, Bart, on the death of Lady Frederica Louisa Renwick, who passed away on July 12th after a short illness, at Coombe Oak, Coombe Warren, Kingston Hill.

Will.—The late Sir JAMES KEMNAL left £452,726 gross (unsettled) and £438,495 net personalty.

Financial Section.

New Companies, Returns of Share Capital, Debenture Changes, Reports of Electrical Companies, Dividend Results, Transactions in Stocks and Shares.

New Companies Registered.

Almeida Accumulators, Ltd.—Registered as a "public" company on July 1st. The nominal share capital as stated in the memorandum of association is £34,500 in 30,000 7 per cent. cumulative preference shares of £1 each (with priority for return of capital and arrears of dividend in a winding up), and 90,000 ordinary shares of 1s. each, but the directors may, if required to do so by Mr. H. A. Miller, at any time increase the capital. The objects are to acquire any invention relating to the manufacture, application and use of electric power accumulators, and to adopt an agreement with H. A. Miller. The minimum cash subscription upon which the directors may proceed to allotment is 7 shares. The subscribers are:—G. Dixon, 2, Bond Court, Walbrook, E.C., clerk; A. H. Wilson, 48, Lymington Avenue, Wood Green, N.22, clerk, and 5 other clerks. Solicitors: Linklaters & Paines, 2, Bond Court, Walbrook, E.C.4.

Nichols & Hardman, Ltd.—Private company. Registered June 27th. Capital, £250 in £1 shares. Objects: To acquire from K. T. Hardman the benefit of certain existing inventions relating to a wireless aerial apparatus under the name of "Nomast," and other matters, and to adopt an agreement with K. T. Hardman, G. W. Nichols, and Mrs. A. Nichols. The first directors are:—G. W. Nichols, "The Gables," Headroomgate Road, St. Annes-on-the-Sea merchant and shipper; K. T. Hardman, 110, Singleton Avenue, Birkenhead, motor engineer and patentee; Mrs. Anne Nichols, "The Gables," Headroomgate Road, St. Annes-on-the-Sea. Qualification, 50 shares. Registered office: 11, Rumford Place, Liverpool.

William Geipel, Ltd.—Private company. Registered July 4th. Capital, £25,150 in 25,000 5 per cent. preference, 100 ordinary "A," and 50 ordinary "B" shares of £1 each. Objects: To carry on the business of manufacturers of and dealers in machinery, electrical and other instruments, cables, wires, steel, iron, copper and alloys and metals of all kinds, apparatus for the telephone, telegraphic, wireless, and other trades, &c. The first directors are:—W. Guy-Pell

(governing director), 12, Hyde Park Place, W.2; K. S. Geipel, 24, Salisbury Road, Hove, Sussex. Qualification: One "A" or "B" ordinary share. Registered office: Vulcan Works, 156-170, Bermondsey Street, S.E.1.

E.M.S. Industrial Processes, Ltd.—Private company. Registered July 8th. Capital, £20,000 in £1 shares (10,000 7½ per cent. cumulative participating preference and 10,000 ordinary). Objects: To acquire licences or rights in respect of and turn to account processes for the low-temperature carbonisation of fuels and bituminous substances, the treatment and distillation of tars and heavy oils, &c. The subscribers (each with one ordinary share) are:—J. Bennett and P. McGrath, 2, Bond Court, Walbrook, E.C.4, clerks. Registered office: 14, Waterloo Place, S.W.1.

Community Radio, Ltd.—Private company. Registered June 29th. Nominal capital of £2,000 in £1 shares. Objects: To acquire the business of a distributor and relayer of radio, television or other programmes, and radio engineer and manufacturer, carried on by H. C. Holmes at 92, Holmfield Road, St. Annes-on-the-Sea, together with the existing receiving and relaying station, &c. The first directors are:—E. R. Spinks, Holcroft, Lytham; A. T. Liver, Bylands, Lytham; G. A. Spinks, Holcroft, Lytham, dental surgeon; H. J. Liver, Brookfield, Fairhaven, Lytham; H. C. Holmes, 32, Holmfield Road, St. Annes-on-the-Sea, wireless engineer. Solicitor: J. R. Byers, 19, Market Square, Lytham.

United Ebonite Manufacturers, Ltd.—Private company. Registered July 1st. Capital, £30,000 in 15,000 10 per cent. cumulative preference and 15,000 ordinary shares of £1 each. Objects: To carry on the business of manufacturers of and dealers in ebonite, electrical and mechanical engineers, manufacturers of and dealers in mechanical apparatus, instruments, lamps, globes, cables, wires, batteries, dynamos, &c. The subscribers (each with one ordinary share) are:—G. H. U. Dewsbury, Norway Lodge, Station Road, Sidcup, clerk; F. W. Eve, 101, Salisbury House, London Wall, E.C.2, cashier. Registered office: Anglorient House, 31 and 33, Bishopsgate, E.C.2.

M. Coquantin & Co., Ltd.—Private company. Registered July 6th. Capital, £12,000 in £1 shares. Objects: To acquire the electrical wire business now carried on by M. Coquantin at 37, Drury Lane, W.C.2, and the business of manufacturing silk and cotton coverin- now carried on at 113, New North Road, N.1. The subscribers (each with one share) are:—M. E. Coquantin, St. Ives, Drake Road, Westcliff-on-Sea, electrical wire manufacturer; K. A. Brown, 27, Crowstone Road South, Westcliff-on-Sea, merchant. M. E. Coquantin is the first director. Registered office: 37, Drury Lane, W.C.2.

Gas Light Fittings Co., Ltd.—Private company. Registered July 4th. Capital, £3,000 in £1 shares. Objects: To acquire the business of an electrical engineer, wireless engineer, and dealer in mantle and gas fittings at present carried on by A. Wiseman at 318 and 322, Walworth Road, S.E.17, 128, King Street, Hammersmith, W.6, 215, Rye Lane, Peckham, S.E., and 130, High Street, E.17. The first directors are:—A. Wiseman (permanent managing director and chairman), and G. G. Wiseman, both of 128, King Street, Hammersmith, W.6. Registered office: 322, Walworth Road, S.E.17.

E. J. Wilcock, Ltd.—Private company. Registered July 8th. Capital, £1,000 in £1 shares (500 8 per cent. cumulative preferred and 500 ordinary). Objects: To carry on the business of electrical, wireless, automobile, mechanical, consulting and general engineers, ironfounders, &c. The directors are:—E. J. Wilcock, electrical engineer (permanent director and chairman), and Mrs. F. M. Wilcock, 52, School Road, Hall Green, Birmingham. Registered office: 32, Cowper Street, Birmingham.

Quartz Oscillators, Ltd.—Private company. Registered July 7th. Capital, £1,000 in £1 shares. Objects: To carry on the business of manufacturers of and dealers in minerals and crystals and scientific apparatus, &c. The first directors are:—A. Hinderlich (permanent managing director), 15, Lyncroft Gardens, N.W.6, electrical engineer; Elizabeth Cuff, 44, Woodlands Road, Southall. Qualification (except first directors), £100 shares. Remuneration of A. Hinderlich, as managing director, £250 per annum. Registered office: 18, Ludgate Hill, E.C.4.

Nivex Gauge, Ltd.—Private company. Registered July 6th. Capital, £1,000 in £1 shares. Objects: To adopt an agreement between J. H. Runbaken and S. Hibbert, and to carry on the business of electrical, wireless, motor, mechanical or other engineers or manufacturers, &c. The first directors are:—J. H. Runbaken, Maryvale, Hill Top, Wilmslow, Cheshire; S. W. Lewis, 39, Victoria Street, S.W.1 (both permanent, subject to each holding 100 shares). Registered office: 30, Tipping Street, Ardwick, Manchester.

Waite & Son, Ltd.—Private company. Registered June 30th. Capital, £7,000 in £1 shares. Objects: To acquire the business of Waite & Son, lampshade manufacturers, of Avenue House, Peckham, S.E.15, and to adopt an agreement with H. J. Waite and H. C. Waite. The permanent directors are H. J. Waite and H. C. Waite, Avenue House, Hanover Park, Peckham, S.E.15, lamp shade manufacturers; and Col. S. C. Halse, C.M.G., 4b, The Mansions, S.W.5.

Official Returns of Electrical Companies.

Burdette & Co., Ltd.—Debenture charged on the company's undertaking and property, present and future, including uncalled capital; and charge on leasehold premises numbered 5 and 7, Pocock Street, Blackfriars Road, Southwark, both dated June 10th, 1927, to secure all moneys due or to become due from the company to Barclay's Bank, Ltd., respectively.

Shoreham and District Electric Lighting and Power Co., Ltd.—Particulars filed of £5,000 debentures, authorised June 23rd, 1927, charged on the company's undertaking and property, including uncalled capital (subject to first mortgage debenture in favour of H.M. Treasury solicitor), the amount of the present issue being £1,400.

Stockport Rubber and Vulcanite Co., Ltd.—Particulars filed on June 28th, of £2,000 debentures, authorised March 10th, 1927, charged on the company's undertaking and property, including uncalled capital, the amount of the present issue being £1,600.

Leatherhead and District Electricity Co., Ltd.—Capital, £100,000 in 25,000 preference and £75,000 ordinary shares of £1 each. Return dated March 31st, 1927. 58,748 ordinary and 25,000 preference shares taken up. £83,748 paid. Mortgages and charges: £61,550.

Yorkshire (West Riding) Electric Tramways Co., Ltd.—Capital, £600,000 in 350,000 preference and 250,000 ordinary shares of £1 each. Return dated April 6th, 1927. 231,305 preference and 204,885 ordinary shares taken up. £436,190 paid. Mortgages and charges, £256,168.

A. P. Maglen, Ltd.—Debenture dated June 13th, 1927, to secure £1,700, charged on the company's undertaking and property, present and future, including uncalled capital. Holder: W. R. Preston, 27, Cranes Drive, Surbiton.

Telegraph Construction and Maintenance Co., Ltd.—Capital, £896,400 in £12 shares. Return dated March 31st, 1927. All shares taken up. £448,200 paid, £448,200 considered as paid. Mortgages and charges, nil.

Chesham Electric Light and Power Co., Ltd.—Capital, £25,000 in £1 shares. Return dated March 15th, 1927. All shares taken up. £10,000 paid, £15,000 considered as paid. Mortgages and charges: £35,000.

Salisbury Electric Light and Supply Co., Ltd.—Capital, £75,000 in £1 shares. Return dated March 28th, 1927. All shares taken up. £72,500 paid, £2,500 considered as paid. Mortgages and charges: £16,200.

H. J. Cash & Co., Ltd.—Capital, £25,000 in £1 shares. Return dated March 1st, 1927. 15,000 shares taken up. £10,000 paid, £5,000 considered as paid. Mortgages and charges, nil.

F. W. Bland & Co., Ltd.—R. Gibbons, accountant, of 37, Seahouse Street, Maryport, was appointed receiver on June 27th, 1927, under powers contained in debentures dated June 8th, 1926.

Costa Rica Electric Light and Traction Co., Ltd.—Capital, £130,000 in £1 shares. Return dated April 13th, 1927. All shares taken up. £7 paid, £129,993 considered as paid. Mortgages and charges: £280,550.

J. Stone & Co., Ltd.—Capital, £1,200,400 in 600,000 preference and 600,400 ordinary shares of £1 each. Return dated June 3rd, 1927. All shares taken up. £1,200,400 considered as paid. Mortgages and charges, nil.

Robey & Co., Ltd.—Four mortgages on various properties in Johannesburg, South Africa, and Lincoln, all dated June 10th, 1927, to secure all moneys due or to become due from the company to the Midland Bank, Ltd., respectively.

Victoria Garage and Electrical Co., Ltd.—Particulars filed of £700 debentures authorised June 23rd, 1927, charged on the company's undertaking and property, present and future, including uncalled capital, the whole amount being now issued.

Finston Manufacturing Co., Ltd.—C. O. Skey, C.A., of 10, St. Swithin's Lane, E.C.4, was appointed receiver and manager on June 23rd, 1927, under powers contained in debentures dated May 14th, 1926.

International Electrolytic Plant Co., Ltd.—A. Cripwell, incorporated accountant, of 12, Cherry Street, Birmingham, was appointed receiver and manager on June 24th, under powers contained in debenture dated April 22nd, 1927.

Pyramid Products, Ltd.—G. F. Chadderton, accountant and advertising contractor, of 33, Brazennose Street, Manchester, was appointed receiver on June 18th, under powers contained in debentures dated February 3rd, 1927.

Watford Electric and Manufacturing Co., Ltd.—Satisfaction to the extent of £500 on May 31st, 1927, of debenture dated May 31st, 1923, securing £3,000. (Previously satisfied £1,500.)

Orford Electric Light and Power Co., Ltd.—Issue on November 1st, 1923, of £500 debentures, part of a series already registered. (Notice filed July 1st, 1927.)

City Notes.

Crompton & Co., Ltd.

The directors' report for the year ended March 31st last shows a net profit of £26,928 (as compared with £16,446 in the preceding year), to which is added £18,522 brought forward, making £45,450. After providing for the 7 per cent. preference dividend and transferring £10,000 to general reserve, a balance of £25,600 is carried forward. The last ordinary dividend was 5 per cent. paid in respect of 1921-22.

The annual meeting is to be held on July 19th, followed by an extraordinary meeting to consider resolutions providing for alterations in the articles of association necessitated by the following amalgamation scheme.

Accompanying the report, the shareholders have received a document describing a scheme under which the business of Messrs. Crompton & Co., Ltd., is to be amalgamated with that of Messrs. F. & A. Parkinson, Ltd., the well-known electric motor manufacturers of Guiseley, the new name being "Crompton-Parkinson, Ltd." The directors state that in view of the continuance of the competition that has been experienced in recent years, they have kept in mind the possibility of strengthening the earning capacity of Crompton & Co., Ltd., by amalgamation with other concerns engaged in the same trade. They were recently approached by the directors of Messrs. F. & A. Parkinson, Ltd., who have carried on for some years, with increasing success, the manufacture of a.c. motors in a factory laid out for quantity production. After full investigation they entered into a provisional contract for the acquisition of all the shares of the company on an amalgamation basis. Messrs. Parkinson's profits for the year ended June, 1925, were £26,227; for the following year £35,727, and for the half year ended December, 1926, £19,975, an average of £32,772 per annum for the two and a half years. For the three years ended March, 1927, the profits of Crompton & Co., Ltd., were £63,691, an average of £21,230 per annum. The present issued share capital of Crompton & Co., Ltd., is £467,494 and that of F. & A. Parkinson £83,267. The proposed issued capital of Crompton & Co., Ltd., after the amalgamation, will be £547,494. Cromptons will acquire the whole of the issued share capital of Parkinsons in exchange for the issue of 30,000 8 per cent. cumulative preference shares of £1 each, fully paid, and 50,000 deferred ordinary shares of £1 each, fully paid. Each existing 7 per cent. preference share in Cromptons is to be converted into one 8 per cent. cumulative non-participating preference share of £1, fully paid. Each existing ordinary share in Cromptons is to be converted into one preferred ordinary share entitled to 6 per cent. cumulative dividend. The directors consider the amalgamation an advantageous one and recommend its acceptance, ensuring as it does, in their opinion, a good and regular return with greater security.

Globe Telegraph and Trust Co., Ltd.

This company, whose report was reviewed in our last issue (p. 73), held its annual meeting on July 5th. Sir John Denison-Pender (chairman), who presided, said that the results had again been very satisfactory and they anticipated that if they obtained the same return from their investments for the current year their income would be increased by £5,000. All the companies in which they were interested had maintained their rates of dividend in spite of the industrial troubles. They had accepted an offer for the purchase of their holding in the Cuba Submarine Telegraph Co. by the Direct West India Telegraph Co.; that involved a small capital loss. The Submarine Cables Trust terminated last year. The trust had paid 6 per cent., free of tax, on its certificates; those certificates were redeemed by a yearly drawing at £20 premium; and each reversionary coupon now received £153 2s. 6d. Thus that investment had proved a very good one; the company had from time to time purchased reversionary coupons and had made a profit of £116,000 in that way. The profit made had been partly re-invested in cable stocks, and it had enabled them to widen their investments by the purchase of a few telephone stocks and shares. The lease of the American Telegraph Co.'s two cables to the Western Union Telegraph Co. would terminate in 1932 and there would then be a considerable depreciation in the value of the bonds. Efforts were being made to clear up the position before the agreement expired. They proposed in future to pay the quarterly dividends on March 30th, June 30th, September 30th, and December 30th. The value of the company's holdings on May 31st last showed an appreciation of £2,465,407 over cost.

Dubilier Condenser Co. (1925), Ltd.

The annual meeting was held on July 7th, Sir A. L. Dickinson (chairman) presiding. In moving the adoption of the report (ELEC. REV., July 1st, p. 29), the chairman said that owing to the continued depression in the radio trade and to industrial disputes, the results were again unsatisfactory. The company found that the best course to follow was to concentrate all the business of its English subsidiaries in the "Ducon" works and so reduce overhead expenses. It was necessary to proceed cautiously on new developments. The Mansbridge Co.'s buildings at Shepherd's Bush had been sold and the machinery had been transferred to the Ducon works. Mr. W. H. Goodman, who seconded the motion, considered that the lowest point of depression had been reached and they could hope for improvement. That improvement would not, however, benefit the industry unless its sections worked much more closely together. The matter of foreign competition, at selling prices lower than British manufacturers' factory costs, could only be dealt with by the trade as a whole. The company had done a great deal of research work in the condenser field; special plant was being installed and in due time they might expect a large demand.

The "Underground" Group.

The railway companies of the "Underground" group have declared the following interim dividends:—

Metropolitan District Railway Co.—A half-year's dividend on the guaranteed and first and second preference stocks; and 2 per cent. on the ordinary stock (against 1½ per cent.).

London Electric Railway Co.—Half-yearly dividend on the preference stock and 2 per cent. on the ordinary stock (against 1¾ per cent.).

City and South London Railway Co.—Half-yearly dividends on the preference stocks and 2 per cent. (against 1½ per cent.) on the ordinary stock.

Central London Railway.—Two per cent. on both the undivided and preferred ordinary stocks, as in 1926.

Underground Electric Railways Co. of London, Ltd.—Half-yearly dividends on the first cumulative income debenture stock and income bonds; and 2 per cent. on the ordinary shares. No interim ordinary dividend was paid last year; the full year's dividend was 1½ per cent.

Companies to be Struck off the Register.

The following companies will be struck off the Register and dissolved unless cause is shown to the contrary before October 8th:—

Astro Electric, Ltd.
Beaver Electrical Supply Co., Ltd.
Delta Electrical and General Engineering Co., Ltd.
Eclat Electric Manufacturing Co., Ltd.
Electric Hammers, Ltd.
Electric Tools and Motors, Ltd.
G. Davenport & Co., Ltd.
Hill's Wireless Stores, Ltd.
London Mica and General Supply Co., Ltd.
National Radio Corporation, Ltd.
Radio-Constructa, Ltd.
St. Mark's Electrical Co., Ltd.
Wilson, Hartnell & Co., Ltd.
Youldophone, Ltd.

Edmundsons' Electricity Corporation, Ltd.

The report for the year ended March 31st last shows a net profit of £99,715, after providing for income tax and debenture charges, as compared with £84,431 for 1925-26. A balance of £19,590 brought forward is added, making £119,305. It is proposed to transfer £25,000 to reserve, and £2,000 to the staff benevolent fund, and to pay a final dividend of 7 per cent. on the ordinary shares, making 10 per cent. for the year (against 8 per cent.); £24,305 is carried forward. A statement of investments in and advances to subsidiary and other companies is embodied in the report. The figures at March 31st last were: Shares, £1,023,649; debentures, £261,748; advances, £43,477; total, £1,328,871. The principal investments are the Urban Electric Supply Co., Ltd. (£320,020), the Isle of Wight E.L. and P. Co., Ltd. (£169,305), and the Guernsey E.L. & P. Co., Ltd. (£161,890). Meeting, July 20th.

Southern Brazil Electric Co., Ltd.

A meeting of the holders of the company's 6 per cent. mortgage debentures is to be held to-day (Friday) to consider resolutions providing for the creation of prior lien bonds or debentures to an amount not exceeding £300,000, the interest to be 7 per cent. or less. It is proposed to pay in cash all arrears of dividend on the 6 per cent. debentures and to raise the interest as from January 1st to 6½ per cent. Special arrangements are being made for the redemption of the debentures.

French Companies.

The *Compagnie Générale de Télégraphie sans Fil* is paying a dividend of 50 fr. per share out of net profits of 8,507,000 fr. in 1926.

The *Compagnie Française des Câbles Télégraphiques* reports gross profits of 7,382,000 fr. for 1926, as compared with 5,338,000 fr. in the previous year. It is proposed to increase the dividend on the ordinary shares from 30.05 fr. to 35 fr.

The *Société d'Electro-Chimie et des Aciéries Electriques d'Ugine*, whose business is based chiefly on the utilisation of water power, reports that extensions of the works were carried out and the production of electrical energy increased by 20 per cent. over 1925. The electro-chemical and electro-metallurgical branches were very active. The accounts show net profits of 9,894,000 fr., and the dividend is 50 fr. per old share and 25 fr. per new share.

The *Compagnie Parisienne de Distribution d'Electricité* records further progress in 1926 and available net profits of 39,000,000 fr. The dividend is at the rate of 65 fr. per share The company's output exceeded 500,000,000 kWh.

The *Compagnie Electro-Mécanique* has decided to carry forward the net profits of 333,000 fr. earned in 1926. Although the prices for heavy plant were inadequate, the results for last year permitted of large provision for depreciation, an increase in the funds available, and a reduction in the obligation debt.

The *Société des Accumulateurs Monoplaque* records net profits of 184,000 fr. for 1926; the dividend is 8 per cent.

The *Compagnie d'Electricité et de Traction en Espagne* reports net profits of 341,000 fr. for 1926, and is paying a dividend of 60 fr. per share.

The *Compagnie Générale d'Entreprises et d'Electrification* has decided to pay a dividend of 13 per cent. for 1926; the gross profits were 525,000 fr.

The *Compagnie Française Thomson-Houston* reports that the turnover in 1926 largely developed as a whole. The increase in the export trade permitted of the maintenance of the total sales on an even level. The various works were reorganised and production was improved. The total sum available for disposal amounts to 31,672,000 fr., of which 12,526,000 fr. has been carried forward and the balance applied to reserve and other funds.

Brazilian Traction, Light and Power Co., Ltd.

The report for the year ended December 31st last records a total revenue of $12,278,654, and a net revenue of $11,745,397 (against $8,255,286 in 1925). Four quarterly dividends of 1½ per cent. each on the preference shares and 1¼ per cent. on the ordinary shares have been paid, leaving a surplus of $5,816,185. This is added to $6,075,907 brought forward, making $11,892,093. From this, $4,000,000 is transferred to general reserve, the balance being carried forward. The board states that the negotiations for improved rates in respect of the tramways and other services have not yet reached any practical result, but it is hoped that the difficulties will be overcome in due course. The meeting is to be held in Toronto on July 21st.

Austrian Company.

The report for 1926 of the *Austrian Siemens-Schuckert Works*, Vienna, refers to the still difficult economic situation, and states that the chief market is at home, although business abroad could not be given up. The business obtained by the foreign subsidiary companies had been secured at great sacrifice. It was impossible to keep the workshops fully occupied; the number of persons employed fell from 6,148 at the close of 1925 to 5,594 in May, 1927. The net profits amounted to 1,868,000 schillings, as compared with 1,830,000 sch. in the previous year; the dividend is maintained at 6 per cent.

Ferguson, Pailin, Ltd.

The report covering the 13 months ended December 31st last shows a net profit of £28,752 (as against £37,383 for the preceding year), to which is added £35,231 brought forward, making £63,983. It is proposed to pay a final dividend of 10 7/12ths per cent., making 13 per cent. for the year (as for 1925), £10,000 is transferred to reserve, and £36,108 carried forward.

Kalgoorlie Electric Tramways, Ltd.

The report for the year ended December 31st last states that the gross receipts fell from £24,847 to £23,661, and the net profit (before allowing for depreciation) from £5,390 to £4,223. The decline in receipts is attributed to the closing down of some of the principal mines with a consequent decrease in the population. During the year £8,570 of "A" debenture stock was redeemed, leaving £25,460 outstanding.

Belliss & Morcom, Ltd.

The accounts for the year ended March 31st last show an available balance of £25,778, after adjustment of taxation reserves no longer required and paying the preference dividend. It is proposed to pay a final ordinary dividend, making 12½ per cent. for the year, against 15 per cent. for 1925-26, and the balance is carried forward.

General Electric Co., Ltd.

The annual meeting was held at Magnet House, Kingsway, W.C.2, on Tuesday last. Sir Hugo Hirst, Bt., presided, and in presenting the report dealt at some length with the position and prospects of the electrical industry. We intend to deal fully with the speech in our next issue.

Allen-Liversidge, Ltd.

The net profit for the year ended April 30th last rose from £52,324 to £58,958. The final dividend is 5 per cent., making 10 per cent. for the year, as for 1925-26.

International Telephone and Telegraph Corporation.

The stockholders are being offered additional common stock at the rate of one new share for each eight held, at $100 per share. The 25-year 5½ per cent. convertible gold debenture bonds outstanding are to be redeemed at 105 per cent. on September 1st.

Bournemouth and Poole Electricity Supply Co., Ltd.

The directors have declared an interim dividend of 4½ per cent. upon the ordinary shares.

Richmond (Surrey) Electric Light and Power Co., Ltd.

An interim dividend of 4 per cent. has been declared on the ordinary shares.

Notting Hill Electric Lighting Co., Ltd.

An interim dividend of 5s. per share, less tax, has been declared on the deferred shares, as against 4s., free of tax, last year.

Swiss Company.

The *Motor Columbus Société pour Entreprises Electriques*, Baden, is inviting subscriptions for 20,000 five per cent. debentures of 1,000 fr. each at 99 per cent. The new issue (approximately £800,000) is being made with a view to the paying off of the six per cent. 1915 and five per cent. 1917 debentures.

Clontarf and Hill of Howth Tramroad Co.

An interim dividend of 3s. per share has been declared.

Yorkshire Electric Power Co.

The directors have again declared an interim ordinary dividend at the rate of 6 per cent. per annum.

Electrical Distribution of Yorkshire, Ltd.

A dividend at the rate of 9 per cent. per annum has been declared in respect of the half-year.

Kensington and Knightsbridge Electric Lighting Co., Ltd.

The directors have declared an interim dividend of 6d. per share on the ordinary shares.

Stocks and Shares.

MONDAY EVENING.

Money.

STOCK Exchange markets have been somewhat disturbed by the incidence of a settlement this week at which it was feared some trouble might eventuate as a result of the death of Mr. James White a fortnight ago. This particular consideration affected speculative stocks and shares more than those in the investment lists, though it had some bearing upon a wide variety of securities. This week's settlement out of the way, the immediate extent of the difficulties will have become visualised, and greater scope will accordingly be given to the expectations of cheaper money that are already beginning to make themselves heard. A conference in New York between a quartette of bankers, one of them the Governor of the Bank of England, may prove to be of first importance in relation to the monetary outlook for the world of finance. Anything which tends to promote a more settled feeling in the mind of the investor, and of the money markets, is bound to make its influence felt upon stocks and shares.

Underground Dividends.

The dividend declarations of the London Underground electric railways have now made their appearance, and are regarded as very satisfactory. The most interesting announcement is that of the Underground Electric Railways of London, whose £1 shares have been a popular speculative counter for the past six months. The price has been down to 12s. 6d. this year, from which it rose recently to within a few pence of its par value. It now stands at 18s. 9d., and the company has declared an interim dividend of 2 per cent., raising the hope that the final dividend will be 3 per cent., to make 5 per cent. for the year, as against 1½ per cent., paid in March last, the first distribution the shares have received since their creation. This 2 per cent. interim dividend is up to the best expectations that have been formed, but it led, of course, to a little profit-taking, and this is the reason why the price has failed to justify the anticipations of those who were talking it to well over 20s. in the immediate future.

"Districts."

The District is to pay an interim dividend of 2 per cent., as against 1½ per cent. a year ago, and this also flatters anticipations of a final to make 5 per cent. for the year, as against 3½ per cent. for 1926. The yield on Districts is so much higher than that offered by the Underground Electric Railways of London shares, that Districts are generally agreed as standing relatively lower than the £1 shares of the Underground company. The contention is sound enough, but, for some reason or other, greater speculative interest attaches to the shares than to District ordinary stock, though the latter may be considered a good speculative investment with prospects of capital appreciation. The dividends on City and South London and Central London are interesting only from the academic point of view, as their ordinary stocks are not dealt in, being held by the predominant partner. The Associated Equipment Company is to pay 4 per cent., tax free. Last year nothing was paid for the first half, but for the whole of 1926 the company distributed 8 per cent., tax free, and thus became an important contributor to the fund from which Underground Electric Railways of London shares draw their dividends. The London General Omnibus dividend of 3½ per cent., tax free, is an increase of 10s. over last year's rate.

Nominal Considerations.

The latest-admitted clerk to the Stock Exchange blushed vividly when he heard jobbers proclaiming their anxiety to deal in Undergrounds by the intimate nickname to which the title has become shortened in the market.

Reactions.

Cable Construction shares have turned a trifle reactionary after their long-sustained strength. Henley's, British Insulated, Callender's and Telegraph Constructions have gone back from the prices of a week ago. English Electrics and Electric Constructions have gone back. Edison 5 per cent. debenture is 2 points higher at 85½.

Electricity Supply.

Edmundsons' report justified the rise that took place in the price of the shares on the eve of the dividend announcement. With net profit £15,300 up at £99,715, the dividend goes up 2 per cent. into double figures, the 10 per cent. for 1926-27 comparing with 8 per cent. and 7 per cent. in 1926 and 1925, respectively. At the present price of 31s. 3d. the yield on the money is nearly 6½ per cent. Westminster ordinary are better at 25s. Of the foreigners, Whitehall preference have come into demand, and buyers find they have to give a guinea for the shares. County of London new debenture receded to its issue price of 96. The price rose, it may be recalled, to 1¾ premium, and the decline is due to sales by stale stags—a phrase easier to write, perhaps, than to pronounce.

Traction Fluctuations.

Mexican Light and Power preferred shares are quoted ex dividend arrears, and the price at 67¼ is 35 points lower, this being an approximation to the money value of the deduction. Mexicans are somewhat out of favour, but Brazilian Tractions have regained 8 points, being up to 168—after touching 170½—and the preferred at 138¼ showing a net gain of 6. In the dollar list, Shawinigan Water capital stock declined to 82½, after reaching 85. Amongst the Argentines, La Plata Trams receded to 4s. 3d., and Anglo-Argentines are both down, the first and second preference at 3¾ and 3 7/16ths, respectively, as a result of the chairman's speech at the recent meeting. British Electric Tractions lost a point, at 118¼. The deferred shares kept steady at 3¾, at which price stock is available at the time we write.

"Plates" and Other Telephones.

On a withdrawal of American buying, United River Plate Telephones weakened to 10½. Prophets in the Press have been talking the price to 20, and this apparently led some people to take the very handsome gains which £10, and over, offers them on their purchase price. Bogota Telephones picked up to 33s., and the new shares remained at 3s. 6d. premium. Further dullness in Venezuela Telephones leaves the price at 27s. Dealings have started in the £1 ordinary shares of the Sphere Investment Trust, at 16s. 3d., the company holding the principal interest in the Atlas Trust. Telephone Manufacturing 10s. shares have dropped to 5s. 7½d. owing to the sale of a fairly large parcel of shares. When this is absorbed—it consists of over 50,000 shares—the price should recover, because the company is doing well, and now belongs to the proprietors of the ordinary capital, its other indebtedness having been paid off. The International Telephone and Telegraph Corporation's new issue of common stock at par will be made in the proportion of 12½ per cent.; one new share is to be offered in respect of eight old shares held. The subscription letters are to be sent out on September 6th next. In the same month the company's 5½ per cent. convertible gold debenture bonds are to be paid off at 105.

Cable and Wireless.

The cable market is very quiet, and in the wireless group Marconis continue heavy. Marconi Marines have gone back to 26s. 3d., and Canadians are 5s. 4½d. At the Dubilier Condenser meeting Sir Lowes Dickinson claimed that it was no small achievement for the company to have kept intact surplus investments amounting to over £50,000, and to have paid the full dividend on its preference shares.

Debenture Stocks and Their Quotations.

We have been asked to extend our price-lists by the inclusion therein of debenture stocks of the electrical supply companies as being likely to interest a wide circle of investors who rarely see the quotations given in other papers. It is, of course, our unceasing aim to afford as much information and news as can be desired by readers. In regard to the debenture stocks of the home electricity supply companies, however, the supply of stock available for prospective purchasers is as a rule so limited as to render the market restricted to an extent which makes its stocks scarcely entitled to regular quotation. Holders of securities who know that they possess a first-rate stock trouble little about the course of a price that moves but rarely, from one end of the year to the other. The would-be buyer, on the other hand, is exasperated if he finds that the particular stock which he desires to purchase so seldom comes to market that it is almost impossible for him to hope to get it within a reasonable time. For these reasons the weekly quotation of debenture stocks is not undertaken here, but it cannot have escaped notice that from time to time mention is made, and lists are given, of such debenture stocks when these happen to be obtainable. The investor on the look-out for such securities is thus able to see what he can obtain, and, at the same time, the holder of the stocks gets an idea of the quotations which prevail in the market.

Share List of Electrical Companies.

	Nom.	Dividend. 1925.	Dividend. 1926.	Price July 11 1927.	Rise or fall.	Yield. p.c.
HOME ELECTRICITY COMPANIES.						
Bournemouth and Poole	£ 1	14	14	59/6	—	4 14 1
Brompton Ordinary	1	10	8⅝	25/-	—	5 12 0
Charing Cross Ordinary	1	15	8½	25/6	—	5 12 0
do. do. 4½ Pref.	1	4½	4½	17/6	—	5 2 10
Chelsea	1	12	8⅝	25/-	—	5 12 0
City of London	1	15	10	27/-	—	7 8 2
do. do. 6% Pref.	1	6	6	22/6	—	5 6 8
Clyde Valley	1	8	8	30/6	—	5 5 0
County of London	1	15	7½	28/-	—	5 0 0
do. do. 6% Pref.	1	6	6	22/6	—	5 6 8
Edmundson's Ordinary	1	8	10	31/3	—	6 8 2
do. 7% Pref.	1	6	7	24/-	—	5 16 8
Elec. Supply Corporation	1	10	10	22/-	—	8 5 0
Kensington Ordinary	1	15	8	25/6	—	6 5 6
Lancs. Light and Power	1	7½	7½	26/-	—	5 15 5
London Electric	1	10	8½	24/-	—	5 16 8
do. do. 6% Pref.	5	6	6	5⅝	—	5 6 8
Metropolitan	1	11	8	29/-	—	4 16 7
do. 4½% Pref.	1	4½	4½	17/-	—	5 8 6
Midland Counties	1	5½	6	22/6	—	5 6 8
Newcastle-on-Tyne Ordinary	1	7	6	22/6	—	4 8 6
do. 5% Pref.	1	5	5	17/6	—	5 14 3
do. 7% Pref.	1	7	7	24/6	—	5 14 3
Notting Hill 6% Pref.	10	6	6	10½	—	5 17 1
North Met. Elec. 6% Pref.	1	6	6	22/-	—	5 9 1
St. James' and Pall Mall	5	17½	8	25/6	—	5 9 10
South London	1	15	8½	25/-	—	5 12 0
South Metropolitan Pref.	1	7	7	1¼	—	6 3 0
Urban Ordinary	1	7	7	25/-	—	5 12 0
do. 6% Pref.	1	6	6	1⅛	—	5 18 0
Westminster Ordinary	1	15	8½	25/-	+6d.	5 12 0
Whitehall Elec. Invst. 7½% Pref.	1	7½	7½	20/9	—	7 4 7
Yorkshire Elec.	1	8	8	30/-	—	5 6 8
HOME RAILS.						
Central London Ord. Assented	Stock	4	4	71	—	5 12 8
Metropolitan	,,	5	3	53	—½	5 8 5
do. District	,,	3½	3½	65	—	5 7 8
Underground Electric	£1	Nil	1½	19/-	—	1 11 7
do. do. Income	Bonds	6	6	103	+1	*5 16 6
TELEGRAPHS AND TELEPHONES.						
Anglo-Am. Tel. Pref.	Stock	6	6	102	+½	5 17 8
do. Def.	,,	1½	1½	24½	—	6 1 5
Automatic Telephone	1	8	10	47/6	—	4 3 6
Chili Telephone	5	5	6	7⅝	—	3 17 5
Eastern Extension	10	10	10	18½	—¼	*5 8 1
Eastern Tel. Ord.	Stock	10	10	182½	—	*5 9 7
Globe Tel. and T. Ord.	10	10	10	18½	—	*5 7 5
do. do. Pref.	10	6	6	11	—	5 8 1
Great Northern Tel.	10	20	20	28½	—	7 0 4
Indo-European	25	8½	10	45½	—	*5 7 6
Marconi	1	Nil	Nil	18/9	—	... ...
Marconi-Marine	1	7½	8½	21/3	—9d.	6 13 4
Oriental Telephone Ord.	1	12	12	53/9	—	*4 9 4
United R. Plate Tel.	5	8	8	10½	—⅛	*3 18 9
Western Telegraph	10	10	10	17⅝	—	*5 13 6
HOME AND FOREIGN TRAMS, &C.						
Anglo-Arg. Trams First Pref.	5	5½	5½	8¾	—⅛	8 3 0
do. do. 2nd Pref.	5	6	6	8 1/16	—⅛	9 1 2
do. do. 5% Deb.	Stock	5	5	72½	—	6 17 11
British Electric Traction Ord.	,,	8	8	118½	—1	6 15 0
do. do. 6% Pref.	,,	6	8	117½	—	6 10 0
Brazil Traction	100	5	6	168	+8	3 11 5
Brit. Columbia Elec. Rly. Pcc.	Stock	5	5	89½	—1	5 11 9
do. do. Preferred		6⅔	6⅔	121	+1	5 3 4
do. do. Deferred	,,	8	8	156	—	*5 2 7
do. do. Deb.	,,	4½	4½	78½	—2	5 8 3
London & Sub. Trac. 5% Pref.	1	Nil	Nil	8/-	—	Nil
London United Tram. Deb.	Stock	4	4	51½	—	7 12 5
Mexico Trams, 5% Bonds	—	5	5	80½	—	6 4 3
Mexican Light Common	100	Nil	Nil	42	—	Nil
do. Pref.	100	Nil	Nil	67½xr	—	Nil
do. 1st Bonds	—	5	5	72½	—1	6 17 0
Yorkshire (West Riding)	1	5	—	8/9	—	... ...
MANUFACTURING COMPANIES.						
Babcock & Wilcox	1	13	13	52/6	—	4 19 1
British Aluminium Ord.	1	12½	10	43/9	—	4 9 1
British Elec. Transformer Pref.	1	Nil	7	18/3	—	7 13 6
British Insulated Ord.	1	15	15	68/9	+6d.	4 7 3
Brush Ord.	1	10	10	26/3	—	7 12 4
Callenders	1	15	15	3⅞	—	4 4 0
do. 6½% Pref.	1	6½	6½	23/9	—	5 9 5
Crompton Ord.	1	Nil	Nil	18/9	+1/3	... ...
Edison-Swan	4/-	10	10	10/-	—	4 0 0
do. 5% Deb.	Stock	5	5	85½xd	+2	5 17 0
Electric Construction	1	10	7½	25/-	-1/3	6 0 0
Enfield Cable Pref.	1	7½	7½	25/-	—6d.	6 0 0
English Electric	1	Nil	Nil	8/9	—1/3	... ...
do. do. Pref.	1	8	—	12/6	—	... ...
Gen. Elec. Pref.	1	6½	6½	23/6	—	5 10 8
do. Ord.	1	7½	7½	29/6	—	5 1 8
Henley	1	20	25	97/-	—6d.	5 3 0
do. 4½% Pref.	5	4½	4½	4½	—	5 6 0
India-Rubber	1	5	5	1	—	*5 0 0
Johnson & Phillips	1	17½	12½	2½	—	5 0 0
Met.-Vickers Ord.	1	8	8	27/6	—	5 11 4
do. Pref.	3	8	8	2⅝	—	6 14 9
Siemens Ord.	1	7½	7	25/-	—	6 0 9
Telegraph Construction	13	10	10	28½	—½	*4 5 0

* Dividends paid free of Income Tax.

The Electrical Trade of Hungary.

Statistics for 1925 and 1926 Compared.

THE following table gives particulars of Hungary's imports and exports of electrical machinery last year, the total values in 1,000 gold crowns being stated, together with the total weights in quintals, and the weights by countries of origin or destination. Comparative figures for 1925 are added, and notes of any increases or decreases also given :—

Imports.

	1925.	1926.	Inc. or dec.
Dynamos, motors and transformers—			
Value in 1,000 gold crowns ...	2,440	2,860	+ 420
Quintals	4,730	4,545	− 185
Austria	1,222	1,393	+ 171
Czecho-Slovakia	669	560	− 109
Germany	1,587	1,340	− 247
Italy	45	83	+ 38
Holland	5	22	+ 17
Heating and cooking apparatus—			
Value in 1,000 gold crowns ...	112	75	− 37
Quintals	147	129	− 18
Austria	50	37	− 13
Germany	14	87	+ 73
Electric meters—			
Value in 1,000 gold crowns ...	258	410	+ 152
Quintals	200	306	+ 106
Austria	68	33	− 35
Germany	—	215	+ 215
Belgium	1	54	+ 53
Electric measuring and signalling apparatus—			
Value in 1,000 gold crowns ...	127	114	− 13
Quintals	52	57	+ 5
Germany	34	48	+ 14
Austria	12	7	− 5
Telegraph and telephone apparatus—			
Value in 1,000 gold crowns ...	492	1,860	+1,368
Quintals	294	872	+ 578
Austria	—	337	+ 337
Germany	168	396	+ 228
Holland	—	29	+ 29
Conduit, tubing, &c.—			
Value in 1,000 gold crowns ...	96	78	− 18
Quintals	562	389	− 173
Czecho-Slovakia	72	75	+ 3
Germany	70	140	+ 70
Austria	—	173	+ 173
Starters, resistances, regulators, &c.—			
Value in 1,000 gold crowns ...	1,168	1,643	+ 475
Quintals	1,387	2,198	+ 811
Austria	497	783	+ 286
Germany	746	1,021	+ 275
Czecho-Slovakia	20	161	+ 141
Arc lamps and electric projectors—			
Value in 1,000 gold crowns ...	60	83	+ 23
Quintals	58	96	+ 38
Incandescent lamps—			
Value in 1,000 gold crowns ...	257	332	+ 75
Quintals	284	319	+ 35
Austria	60	56	− 4
Czecho-Slovakia	5	2	− 3
Germany	209	208	− 1
Accumulators, batteries and parts—			
Value in 1,000 gold crowns ...	66	164	+ 98
Quintals	194	294	+ 100
Germany	—	120	+ 120
Sweden	—	70	+ 70

Exports.

	1925.	1926.	Inc. or dec.
Dynamos, motors and transformers—			
Value in 1,000 gold crowns ...	4,686	4,257	− 429
Quintals	17,722	19,656	+1,934
Austria	2,385	1,798	− 587
Czecho-Slovakia	114	278	+ 164
Rumania	1,207	1,990	+ 783
Germany	108	47	− 61
Italy	6,007	6,002	− 5
Belgium	1,255	1,008	− 247
Poland	1,316	790	− 526
Jugo-Slavia	404	1,684	+1,280
Brazil	—	524	+ 524
Heating and cooking apparatus—			
Value in 1,000 gold crowns ...	20	5	− 15
Quintals	38	11	− 27
Austria	—	5	+ 5
Germany	6	4	− 2
Electric meters—			
Value in 1,000 gold crowns ...	455	1,038	+ 583
Quintals	955	1,585	+ 630
Austria	9	6	− 3
Rumania	82	178	+ 96
Jugo-Slavia	85	86	+ 1
Italy	422	812	+ 390
Belgium	165	182	+ 17
Poland	181	111	− 70
Electric measuring and signalling apparatus—			
Value in 1,000 gold crowns ...	21	38	+ 17
Quintals	21	44	+ 23
Germany	4	11	+ 7
Austria	—	11	+ 11
Rumania	11	6	− 5
Railway signalling and safety apparatus—			
Value in 1,000 gold crowns ...	160	8	− 152
Quintals	546	69	− 477
Rumania	433	15	− 418
Telegraph and telephone apparatus—			
Value in 1,000 gold crowns ...	713	1,428	+ 715
Quintals	986	1,679	+ 693
Rumania	573	755	+ 182
Germany	11	13	+ 2
Jugo-Slavia	79	417	+ 338
Poland	36	65	+ 29
Conduit, tubing, &c.—			
Value in 1,000 gold crowns ...	31	51	+ 20
Quintals	180	407	+ 227
Rumania	—	394	+ 394
Starters, resistances, regulators, &c.—			
Value in 1,000 gold crowns ...	1,545	930	− 615
Quintals	3,708	2,910	− 798
Austria	580	394	− 186
Jugo-Slavia	73	572	+ 499
Rumania	146	383	+ 237
Poland	125	234	+ 109
Italy	314	521	+ 207
Incandescent lamps—			
Value in 1,000 gold crowns ...	5,886	7,466	+1,580
Quintals	8,959	9,535	+ 576
Austria	1,098	725	− 373
Czecho-Slovakia	831	836	+ 5
Rumania	549	794	+ 245
Jugo-Slavia	477	690	+ 213
Germany	1,593	1,691	+ 98
Brazil	542	1,012	+ 470
Argentina	408	855	+ 447
Accumulators, batteries and parts—			
Value in 1,000 gold crowns ...	143	44	− 99
Quintals	709	175	− 534
Rumania	—	52	+ 52
Jugo-Slavia	—	85	+ 85

United States Electrical Exports.

The total value of electrical goods and apparatus exported from the United States during April last was $8,681,958, a decrease of $621,042 as compared with the corresponding month of last year, but an increase of $130,387 in comparison with March last. It is noticed that there were increases in a number of the light equipment classes: batteries of all kinds, for instance, rose from $644,141 to $802,195, motor-driven household devices from $161,114 to $240,816, and radio apparatus from $495,525 to $664,594. Some of the heavier classes, on the other hand, showed substantial decreases, *e.g.*, steam turbo-generator sets from $283,820 to $85,238, power transformers from $133,029 to $84,002, switchboard panels from $288,166 to $81,829, and switches and circuit breakers (over 10 A) from $289,180 to $151,816. Sparking plugs, magnetos, and other ignition apparatus fell in value from $260,806 to $169,801, electric lighting fixtures (interior and street) from $271,894 to $158,226, and insulated copper wire and cable from $532,376 to $461,543.

Portuguese East Africa Telegraph Imports.

An appendix to a recent D.O.T. report on Portuguese East Africa by Mr. J. Pyke, British Consul at Lourenço Marques, shows that during 1925 414 tons of telegraph and telephone material, valued at 1,374 contos, were imported into the territory. Of this, 413 tons (1,370 contos) came from the United Kingdom.

Tramways & Light Railways Association—II.

The Eighteenth Annual Congress, at Bath.

Some Aspects of Local Passenger Traffic.

By the late W. E. HARDY, M.I.E.E. (*Abstract.*)

When electric tramways came into operation some quarter of a century ago there were no other forms of public passenger transport on the roads which could offer anything like the same advantages. Since that time many other forms of transport have been born, as it were, out of the tramway system, so that to-day one sees the tramway management extending its sphere of influence for many miles in the surrounding neighbourhood, forming a complete transport system, with the tramway as a nucleus. It is the co-ordination of the electric tram with the petrol 'bus which constitutes one of the chief problems of the tramway man of to-day.

When electric tramways were installed in this country, 25 to 30 years ago, I do not think that the engineers laying the permanent-way had any real conception of its attendant cost of upkeep. No one foresaw that when embedding massive rails in the roadway they would so soon suffer from the speed and weight of electric cars, or how quickly a joint would become cupped and a destructive hammer set up. If these facts had been realised at the outset, then probably fares would have been based on a more generous scale, with the result that many tramways would have accumulated sufficient funds to effect improvements which are to-day often found to be impossible, owing to financial stringency. Notwithstanding the disabilities that tramways suffer, new cars are in existence which show a tremendous advance on the car of 20 years ago. More powerful, but lighter motors, ball bearings, hardened gears, better springing, air brakes, and improved body construction have been factors to produce increase of speed and better acceleration, combined with silent running and additional comfort for the passenger. Some of these new cars have been introduced under the most adverse circumstances, reflecting the greatest credit upon the pertinacity and enterprise of the tramway man. Then, again, the new methods for the laying down, repair and upkeep of the permanent-way have made such remarkable strides that the bugbear of the hammered joint is fast disappearing. It is of the greatest importance that new electrical and mechanical equipment for tramway cars should be inexpensive. A case has recently come under my notice of a single-deck 36-seater tramcar costing some £500 more than a new low-loading heavy omnibus chassis on pneumatic tires, fitted with a body of the same seating capacity and having an engine capable of developing 55-80 b.h.p.

Everyone is cognisant of the protest of the Mechanical Road Transport Associations against the recently increased taxation for commercial motor vehicles; when I read these protests I wonder what they would have said if they had been asked to shoulder anything like the burden that tramways nowadays have to bear. In connection with the tramways of Bath I find that if we ran motor-'buses in place of the tramways the additional cost to the ratepayers of the district would be £8,752 per annum, or, roughly, a 5d. rate; so that every tram in this district saves the ratepayers £220 per annum. This figure is applicable to any similar district, and increases as the population becomes denser, to a maximum of approximately £400 per annum. In the first place the ratepayer would have to find the money for the foundations and paving for the portion of the road for which the tramway is at present responsible. But if there were no tramway lines, motor-'buses would be required to give the transport facilities which are at present provided by the tramway cars, and these 'buses would put a great deal of additional wear and tear on the roads, the cost of which would have to be borne by the ratepayers, less the amount recoverable from the Road Fund under the Act of 1921. We have 34 tramcars each with a seating capacity of 55 passengers, and six with a seating capacity of 30. The road tax licence payable for 'buses having a similar seating capacity would be £4,104 per annum. I am assuming that this sum is a correct measure of the damage that would annually result to the roads by the running of these motor-'buses. The total gross annual cost when running motor-'buses would not fall upon the ratepayers, as part would be recoverable from the Road Fund—to the extent of 50 per cent. for first-class roads, 25 per cent. for second-class roads, but nothing in the case of unclassified roads. Again, if there were no tramways, the ratepayer would lose the rates which the tramway undertaking pays upon its track and wires, and also the sum paid in respect of wayleaves or widenings.

It has sometimes been contended that where tramway lines exist the wear and tear on the quarters of the road is excessive by reason of the traffic diversion, but in any case the cost of this would be more than offset by the expense of further strengthening the foundations of some of the roads to withstand a frequent service of heavy 'buses. Mr. Myers, in his very interesting and discriminating paper at Torquay last year, called attention to the tremendous increase in the use of crude oil and petrol, which are foreign productions, and he suggested that it was not difficult to conceive a future when petrol would no longer be economical to use for conversion to power. Close to Bath are the Somerset coalfields—Somerset coal wrought by Somerset men is the fuel which drives the Bath trams. Petrol from the American and Asiatic Continents is the fuel which drives the Bath 'buses. What is true of Bath in this respect is true of every town in these islands.

Tramway men were amongst the first to recognise the possibilities of the motor-omnibus. The stimulus for enlarging the carrying capacity of the motor-'bus has been primarily due to two causes—firstly, the emulation of the tramway in its rapid transportation of large populations, and, secondly, the cheapening of the passenger seat per mile. The original double-deck 'buses carried some 32 to 35 people. More than these numbers are now carried by single-deck 'buses, and the tendency seems ever towards larger units. One of the most cogent factors contributing towards larger units is the extraordinary development of the pneumatic tire, and it is probable that within the next year or two all passenger public-service vehicles will be fitted with these tires. We have now arrived at the time when the pneumatic tire is utilised for large double-deck 'buses. This necessitates the employment of tires having a nominal width of 8 in., and, in order to make room for these without narrowing the frame to a point of instability, as might be the case if they were placed side by side, the natural corollary is to position them trailing one another, hence one of the main reasons for the multi-axle 'bus to cope with dense traffic. It is stated that a rigid six-wheeler will be allowed by law a total overall length of 30 ft., or even 33 ft.

If the anticipations with regard to the rigid six-wheeler are correct, then, by reason of its size, apart from any other advantages which may be attributed to its design, this vehicle must be the omnibus of the future for coping with the transport of crowded areas. Contemporaneously with the advance of the six-wheeler comes the adaption of the six-cylinder engine for heavy passenger work. The increase in flexibility and smoothness of running through wide ranges of speed gives an advantage of great importance to the six-cylinder engine, and it is not surprising that designs are coming forward with six-cylinder high-speed high-compression engines, both of the tappet and sleeve-valve types. The space taken up by these new engines does not greatly exceed the space occupied by the older four-cylinder designs.

Advocates of trolley 'buses claim that it is the most comfortable of public vehicles and that for smoothness and quietness in operation it has no rival. It is also claimed that the cost of operation is somewhere about 2d. per mile cheaper than the petrol 'bus. It has the advantage over the petrol 'bus that its power is supplied from home products, but it lacks the freedom of action of the motor-'bus. Its present-day use seems to be in substitution or as an adjunct of tramways where the traffic is comparatively thin. If the tramway track is abandoned and trolley 'buses substituted, the upkeep of the roadway becomes automatically transferred from the tramway to the highway authority. This is a direct result of modern progress being far ahead of legislation. The trolley omnibus of late years has followed the design of the motor-'bus; it is, therefore, not surprising to find trolley 'buses with a petrol chassis, the propulsion unit being a single motor in place of the petrol engine driving through clutch and gear-box. Regulation is effected by rheostatic control and the shunting of the field current, which latter, in at least one case, is assisted by mechanical governing.

Discussion.

The CHAIRMAN, in calling for discussion upon the paper, asked that it should be as keen as if the author had been with them, for he knew that would have been Mr. Hardy's wish. He hoped there would be discussion on the questions of the scrapping of tramways, the prospects for the six-wheeled vehicle, and of how far it would be possible to get a rubber-tired road-borne vehicle with a capacity at least equal to that of the tramcar and the same running cost per seat mile.

Mr. A. W. A. CHIVERS gave reasons for the high capital cost of the tramcar as compared with the motor-'bus. In the first place, there were double ends and two platforms to the tramcar, as against one in the case of the 'bus; also, the tramcar had double control and brakes operated from both ends, and the tramcar was built in very much smaller numbers than the 'bus. He was surprised at what appeared to be the very high cost of the electrical equipment of a tramcar. To-day this amounted to nearly six-sevenths of the total cost of a modern chassis. It had to be admitted that tramcar electrical equipment did not lend itself to mass production in the same way as automobile equipment, and that there was more hand-work about the former, but it would be interesting to know the real reason for the high cost. Both of the tramway associations were dealing with the question

of the burdens on the undertakings, but it could not be said that any great relief had yet been obtained. As to trolley 'buses, his feeling was that there were only a few cases in which their use would be justified.

Mr. N. CLOUGH said that the question of the adoption of trolley 'buses must be regarded purely as a commercial one. He suggested that the Association should form a committee to go into the whole question and ascertain exactly under what conditions the trolley vehicles could be used. Recently in Chesterfield a double-deck tramcar line had been converted to trolley vehicles, and the revenue had immediately increased by 23 per cent., and he understood that in West Hartlepool, where there had been a complete conversion to trolley vehicles, the earnings had increased by 25 per cent., and also that a similar result had been experienced at Darlington. One reason for this success was, he thought, that the vehicles pulled up at the side of the road. Another reason was that the services of trolley vehicles was much more frequent than the tramcar services. Further, with the trolley vehicle, much more rapid headway could be given. Comparing the petrol 'bus with the trolley vehicle, Mr. Clough said the acceleration on the trolley 'bus was very much more rapid than in the case of the motor-'bus, and he suggested that it would be interesting to take records of acceleration and deceleration in the case of all three forms of transport.

The CHAIRMAN remarked that before a Parliamentary Committee recently it had been stated that the trolley vehicle had become unpopular in some places where it had been installed.

Mr. CLOUGH said that was not in keeping with the increased revenue obtained on trolley-vehicle systems.

Mr. R. S. PILCHER believed that in most cases the motor-'bus held a great advantage in the matter of flexibility. In Edinburgh it often was necessary to transfer 50 'buses from one part of the city to another, and for this purpose trolley 'buses would be useless. Where there were both tramway and motor-'bus systems he did not think there was any room for a trolley-'bus system. It was extraordinary that the motor-'bus had become a popular vehicle from the public point of view. Edinburgh had tentatively ordered six six-wheeler 'buses with a view to reducing the cost per seat. He reminded the meeting that the cost of operating petrol 'buses was rapidly falling. In Edinburgh it had fallen by 1d. per car-mile per annum during the past seven years.

Captain W. V. MORLAND said it should not be assumed that the adoption of the railless trolley vehicle was a cure for all ills; the results likely to be obtained depended solely upon local conditions. Only where there was a fairly dense traffic and the overhead equipment was in good condition would the trolley-'bus justify its adoption. Six-wheelers, he felt, had a distinctly hopeful future, and he was anxiously awaiting complete data on the running and maintenance costs, but to talk of building 'buses to carry 80 or 90 passengers was rather getting away from the practical side of operating transport. Captain Morland pointed out that the greater reliability and freedom from need for constant maintenance, as compared with motor-'bus equipment, justified the relatively higher cost of the tramcar electrical equipment.

Mr. R. H. CAMPION spoke of the financial advantage of being able to use tar macadam between the rails instead of wood blocks. The late Mr. Hardy had told him that it had meant the difference between hardly any and a fair dividend.

A vote of thanks was passed to the secretary for reading the paper.

Chairman's Address. (*Abstract.*)

This is the 30th annual general meeting of the Association, and I am glad to say that we are still going strong. The value of the Association to the tramway industry is, I fear, not always fully appreciated. We are mainly concerned with the interests of company-owned and operated tramways and light railways, but we work hand in hand with our colleagues of the Municipal Tramways and Transport Association on all matters of common interest. We have on our membership roll many distinguished municipal tramway men, and the manufacturing side of the industry is well and ably represented.

There never was a time when the affairs of our industry needed more thought and attention in a collective sense. Passenger transport on our public highways is a vital national necessity, and whether the traffic be carried on steel or rubber, by vehicles propelled by electricity or petrol, matters much to those who have large sums of capital invested in one or the other form of transport. We as an association are concerned with the interests of the electro-steel method and we claim for it full recognition in the scheme of things. As soon as things had settled down after the general strike last year, a revised constitution of the National Joint Industrial Council was agreed to, and further copies of this can be obtained from the secretary. It provides safeguards which, as far as is possible, ensure that the deplorable state of affairs of 1926 shall not be repeated. Wages were stabilised by the tribunal which was set up for the industry in 1924, and there have therefore been only slight local alterations since then, chiefly for the clearing away of anomalies.

The more we can find common interest to the three main sections of the industry, Municipal, Company, and Labour, the better will be our usefulness in all directions. Following the intentions of the Council as outlined by Mr. Verdon Smith last year, it was decided to authorise your Council to make an additional special call upon the companies, not to exceed in any year the total sum of 5s. per tramcar owned, as may be required. It was also decided that the Colonial companies would not be called upon to bear their share. We also recognise that our municipal members already have to meet the calls of their own Association, and that it would not be fair to ask them to bear the double burden. We have, so far, not found the necessity of availing ourselves of our new powers.

Our two chief troubles remain with us: Undue motor-omnibus competition and the unfair burden of the 1870 Tramways Act. With regard to the first question, we are looking to a measure of alleviation by means of the Road Traffic Bill which the Government issued last March. Your Council was invited by the Ministry of Transport to submit its observations thereon, and this it did very fully. The amendments urged are roughly to the effect that when licences are issued to motor-omnibuses, the licensing authority shall have due regard to the rights of existing statutory transport undertakings. We hope that in consequence of our efforts we shall get more recognition of our rights than has been the case hitherto.

With regard to the second question of road maintenance, your Council is continuing to give it serious and constant attention. We rely on the obvious justice of our demands which give to tramways the same measure of relief from maintenance burdens which have been given to other authorities charged by statute with road maintenance obligations. We are not without some hope that we may in due course be successful.

The question of interference with Post Office wires and cables due to electrolytic action is one which is likely to become increasingly important. For this reason the two tramway Associations consulted together with the result that a joint "standing" committee was set up to study the situation. This committee is keeping in touch with the Post Office authorities, and it is believed and hoped that this co-operation will have beneficial results.

The joint committee on rolling stock has also been formed into a "standing" joint committee, as we felt that there was a great deal of useful work still to be done. Its report certainly acted as a stimulant to the various general managers and engineers, and it is highly encouraging and satisfactory to note how much progress has been made during the past year in improving and modernising tramcar equipment.

Our best thanks are due to the joint committee on overhead-line material for the steady and continuous work it is doing for the respective Associations, and I should like to take the opportunity also of thanking Mr. Sturman on your behalf upon his retirement as secretary after many years of office for the excellent work he has done.

Luncheons.

On the first day of the Congress the members were entertained at luncheon at the Grand Hotel, Bristol, by the chairman and directors of the Bristol Tramways & Carriage Co., Ltd., when Mr. W. G. Verdon Smith, C.B.E., managing director, presided. In proposing the toast of the "Tramways and Light Railways Association," Mr. Smith congratulated the Association upon the work it was doing and also its chairman, Mr. Spencer, upon his appointment as chairman of the Joint Industrial Council for the Tramway Industry.

On the Friday the directors of the Bath Electric Tramways, Ltd., entertained those attending the congress to luncheon in the Guildhall, Bath, Mr. Evelyn H. R. Trenow, chairman of the company, presiding. Replying to the toast of "The Tramways and Light Railways Association, Mr. C. J. SPENCER said that people frequently unthinkingly regarded tramways as an obstruction and a danger. Some very remarkable figures were recently presented to the Minister of Transport regarding accidents in the Metropolitan area. In London alone 1,000 people were killed every year by street accidents, and of these tramways were responsible for 30. Moreover, whilst the accidents due to other forms of transport were increasing every year, those due to tramways were decreasing. He did not believe that tramways were responsible for anything like the congestion due to other forms of transport. He had been told that the average speed of movement in Oxford Street, where there were no trams, was two miles per hour during the busy times of the day, whereas the average speed of the L.C.C. and Metropolitan tramways was nearly 10. Recently the Government had set up a Commission to deal with traffic problems in the Metropolitan area, and this had reported that tramways were absolutely essential to Metropolitan traffic. One of the first pieces of legislation the industry would like to see would be the taking away of the burden of the 1870 Act. There was a proper sphere and scope for the 'bus as well as for the tramcar; its use should be co-ordinated and worked in with that of the older form of transport and also with railless trolley vehicles.

Mr. W. G. VERDON SMITH (managing director of the Bristol Tramways and Carriage Co.), proposing "The Chairman," spoke of the cordial relationships that had always existed between the Bristol and Bath Companies, each respecting the other's territory and helping the other when occasion demanded. In wishing Mr. Trenow and his colleagues future prosperity he recalled how harmoniously the Bath Company had always worked with the Bath Corporation, and regarded that as one of the principal elements in the success it had so far achieved.

Selected Radio-Telephone Apparatus.

Recent Developments and Improvements.

New Marconiphone Products.

When framing its 1927-28 policy, the aim of the MARCONIPHONE CO., LTD., has been the provision of a new range of products of enhanced performance and appearance at generally lower prices than last season's. Thus, amongst the quite new introductions is a portable entirely self-contained receiver. The wave-length ranges are approximately 280 to 500 metres and 1,000 to 2,000 metres, and robustness of construction is important in order to withstand considerable vibration when travelling. Model 43 is provided with a strong teak case, and the accumulator, which is of the unspillable type, is practically enclosed in a special compartment giving added protection. Two high-frequency, a detector, and one power valve are made use of, and a cone-type speaker is incorporated, as indicated in fig. 2; terminals are also provided for connection to an outside aerial if the necessity to do so should arise.

Fig. 1.—The "Super-Eight" Set.

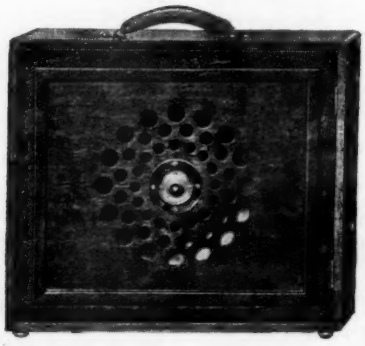


Fig. 2.—The Marconi Portable Receiver.

Fig. 3.—D.C. Mains Outfit.

The "super-eight" set employs eight valves and a superheterodyne circuit, the low-frequency valves being coupled with "Ideal" transformers, and the signals are received on a small frame aerial mounted above the cabinet, which is constructed of mahogany, of unconventional appearance, fig. 1. Only one tuning control is fitted, covering two bands of 250 to 550 metres and 1,000 to 2,000 metres, and the change-over is accomplished by means of two simple switches, no additional coils being required; provision is made for cutting out one of the low-frequency stages, but the last valve, which is of the "super-power" type, is always in circuit. Volume control enables the valves to be switched on and off and adjusted from any point within 10 ft. of the receiver by means of extension wiring and a suitable switch.

Other models are improvements on the existing ones, which they are intended to replace; for example, Model 22 has several features of interest, including condenser tuning, a new anode reaction unit, and its adaptability for operation entirely off a.c. mains, d.c. mains, or batteries, thus affording a choice of power supplies without necessitating alteration of the receiver itself when changing from one system to another.

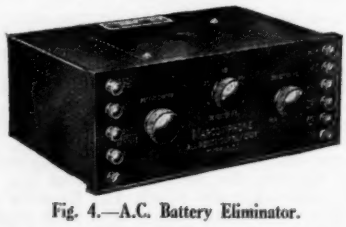


Fig. 4.—A.C. Battery Eliminator.

It should be noted that the new receivers are specified to use the recently-introduced Marconi 2-volt 0.1-A filament general purpose and power valves, whilst the company's "all-power units" have been designed to obviate the use of batteries and enable the receivers to derive their power from 125- or 250-volt domestic mains. The model AC.1 (fig. 4) is for alternating-current mains at frequencies above 40 cycles, and it provides high and low voltage as well as grid bias; four values of h.p. current may be obtained from it, and a 5-stud switch allows for the variation of the detector h.p. voltage. The maximum output from the h.p. positive terminal is 20 mA at 110 V, and the l.p. winding is suitable for supplying one or two Marconi KL.1 valves; the rectifier employed is a U.5 valve.

Model DC.1 is for direct-current mains and suitable for energising 0.1-A valves, providing all the necessary voltages: a meter is incorporated and the filament current may be adjusted by means of a variable high resistance. The h.p. output is 20 mA at 120 V from the h.p. 2 positive terminal and 5 mA at 80 V from the h.p. 1 positive terminal, whilst a third variable voltage is available for the detector, and provision is made for five values of grid bias.

Finally, model DC.3 is an inexpensive instrument for deriving anode voltage from d.c. mains for one- and two-valve sets only, fig. 3: its output from the 120-V terminal is 8 bA, and a 60-V tapping is provided for the detector. Its dimensions are 5×3×2.5 in.

B.T.-H. "Resistor" Amplifiers.

Users of crystal receivers who wish to obtain sufficient volume to work a loud-speaker should know that the BRITISH THOMSON-HOUSTON CO., LTD., has compiled a booklet containing full details for the home construction of the "Resistor" 2-stage amplifier, together with others for 2-, 3-, 4-, and 5-valve receivers; theoretical and working diagrams, lists of components, and point-to-point wiring schedules are included. The amplifier can be constructed in an hour or so, at a cost of a few shillings, and the valves which should be used are the B.T.-H. B.8 in the first stage with a B.23, B.4, or B.6 power-amplifying valve in the last stage. The resistance-capacity method of coupling is employed, as its name implies, and the special characteristics of the B.8 valve enable loud-speaker volume to be obtained without the use of a transformer in the first stage and consequently without affecting the purity of the crystal reception. The working diagram (fig. 5) shows the simplicity of the circuit.

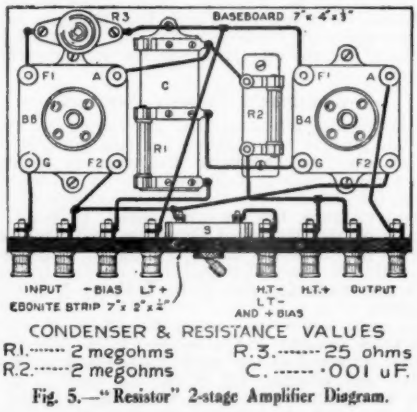


Fig. 5.—"Resistor" 2-stage Amplifier Diagram.

The "Loriostat."

MR. A. W. STAPLETON has sent us a well-made sample of a 3-way "Loriostat," which is designed for baseboard mounting to take the place of fixed valve resistors. When in use each slide is moved along its contact bar to the best position for the valve it controls, after which the set may be switched on and off in the usual way. The component has a good finish and, being made in any number of ways, it can be incorporated in multi-valve sets, affording the advantage that when a valve ages, or is replaced, its resistance can be easily re-adjusted accordingly. Its compactness renders the "Loriostat" suitable for portable receivers.

The Royal Agricultural Show.

Electrical features of the Exhibition and Proceedings.

BY the third day of this year's Royal Agricultural Show, which was held last week at Newport (Mon.), a wave of depression seemed to have crept over the show-ground and the exhibitors, no doubt as a result of the bad weather which had prevailed since the show commenced. Although this feeling of bad-weather boredom had undoubtedly gripped the electrical people and was responsible for many of the grumbles that were heard, some excuse may be found for their complaints apart from the weather.

Almost everywhere one heard the remark: "We can't do anything good electrically—we have no power on the grounds."

At the Royal Show two years ago at Chester the electrical exhibitors were particularly favoured by the excellent facilities which were offered by Mr. S. E. Britton, city electrical engineer, for the supply of electrical energy for demonstrating the use of electricity on the farm. Again at Reading last year electricity was to some extent available. At this year's show no supply was obtainable, and while it could not reasonably be expected that exhibitors should get power for demonstrating free, for an exhibitor to be unable in any way, apart from private generation, to be able to demonstrate his electrical appliances, does not tend to promote good business.

In several cases where oil engines were driving all manner of agricultural equipment, the exhibitor assured us that the engines were only there because of the absence of any electricity supply. Another point in this connection: some of the oil-fuel plant seen running at the stands was of a very high character, in many cases practically silent and vibrationless in running. It is evident that considerable strides have recently been made in oil-engine practice. The pity is that the electric motor which could go just that "one better" was, in most cases, not there. From the observers' avenues was heard more than once: "What do you want better than that?" The answer—the electric motor—was not given.

Considering the difficulties that had to be met with regard to the absence of power, the electrical exhibits may be described as highly creditable. In several instances power was provided by private generating sets, and a large number of exhibitors showed electrically driven machines, stationary, in the "machinery in motion" section, but they were rather lost in the great quantity of other apparatus.

With regard to the exhibition itself, undoubtedly the main electrical feature was the stand of the British Electrical Development Association, Inc., which was arranged by Mr. R. Borlase Matthews. The exhibit was set out to represent the requirements on an "all-electric" farm of 150 acres with about 40 head of cattle and six horses. It is a pity that this interesting point was rather lost sight of in the maze of equipment which it was possible to see on the stand. Some 57 firms had exhibits on it.

On the Thursday the third Electro-Farming Conference was held in the members' large tent, under the presidency of Mr. S. Edwards, chairman of the Monmouthshire County Branch of the National Farmers' Union, when some interesting talks were given by Mr. J. W. Beauchamp, director, Electrical Development Association, Mr. R. Borlase Matthews, Mr. Alfred Ekstrom, D.Sc., Sweden, Mr. C. T. Allan, South Wales Electrical Power Distribution Co., and others. It was evident from the questions that were fired that there is an increasing interest in the farming community in the possibilities of electro-farming and that the work of the promoters of this difficult problem is bearing fruit.

Electro-Farming Conference.

Mr. J. W. BEAUCHAMP opened the discussion with a short talk on "Electric power supply in rural areas," and commenced by detailing the constitution and objects of the Electrical Development Association. The work of the Association was divided into many branches, one of which was devoted to the use of electricity by the farmer and horticulturist and for all classes of rural work. It was not pretended to offer electric power as a complete solution of the difficulties besetting the agriculturist, and his committee, with the exception of a few members who had studied the subject, would not even suggest that they understood these difficulties; but they did know a great deal about their own business, and realising that the farmer was in the same position with regard to his, they desired co-operation between the engineers and farmers for their mutual benefit. It was desirable for farmers to acquire some engineering interest and knowledge, and for engineers to learn a little about the oldest of the world's industries.

In every business in all civilised countries the introduction of electric power had effected a revolution, at least as great as that effected by steam, without the many disadvantages to the community and workers which followed the earlier form of power. For the agricultural and rural worker there could be no more promising field of study than the use of a method of lighting, heating, and driving machinery which could be supplied "on tap" at any hour of the day or night. In recent years a good deal had been accomplished in the electrification of rural areas, but the present time was more opportune for the work than ever before, owing to the spread of electric distribution lines across the country under the schemes for linking up power stations which the Central Electricity Board was carrying out.

The cost of manual labour was high; we did not wish it lower, but all were faced with the need of increasing the yield of man and machine. That electricity did this was a slogan of the Association. To-day the employer who was unable to turn the brains, intelligence, and enthusiasm of his workpeople into production was likely to fall back in the strenuous race for a comfortable livelihood for all.

Mr. Beauchamp hoped that the farmers would become sufficiently interested in electricity to study, not only its use in their homes, farms, or works, but also something of its economic side. No one could afford to be entirely ignorant of how electric power was produced and distributed, its costs, and the reaction which a good power supply could have on the prosperity of a district. After some forty years of invention and development we had learned how to generate electrical energy at very cheap rates, as cheaply as anywhere in the world, but it was necessary to convey it from the power stations and distribute it over the whole country to users great and small. In tackling the problem of electrical distribution in the rural areas, he earnestly asked for the co-operation of farmers, landowners, and everybody concerned in the management of such districts. It was advantageous to all to encourage the supplier of electric power to run his pole-lines liberally across the country, but to delay or discourage him by asking for heavy rentals, or to insist on devious routes, was an unsound policy. The suppliers of electricity were almost all working under statutory limitations; their monopoly was only a monopoly of supplying electricity in a particular area, and in no sense an absolute monopoly. They remained in competition with steam, oil and gas and privately generated electricity, to say nothing of occasional wind and water power. Their maximum prices were fixed by Statute, and greater output on improved conditions which reduced their costs would bring reductions in charges to the consumers. They should not, therefore, be regarded as monopolists in the ordinary sense, but as the administrators of a very valuable public utility or service. In some foreign countries the demand for electricity in rural districts was very keen, and so far from demanding wayleaves for pole lines, the farmers merely made it a condition that the lines should be tapped every few miles, so that they would be able to buy the electricity which they had been waiting for. Co-operative action by farmers had also been taken in some places abroad to cover the cost of overhead lines where the supply undertakings could not find the necessary capital to connect small business which would not become remunerative for many years.

Overhead lines and all electrical work were to-day carried out under regulations which ensured safety; the machinery also was extremely simple and safe.

Mr. R. BORLASE MATTHEWS continued the discussion by a short talk on the "Use of electricity in poultry and dairy work." Owing to the publicity given to the 1926 Electricity Supply Act, more and more interest had been aroused in the more extended use of electrical energy on the farm. Like other industries, farming must use electricity if it was to pay a maximum profit. It was an interesting fact that over 700 British, and nearly a million of the world's, farmers utilised electricity to-day. In the exhibit of the British Electrical Development Association at the Royal Agricultural Show there was a practical example of the many uses to which electricity could be put on the farm. It was really essential for every farmer to see that he got a supply of electricity; where a public supply was not available, it would pay him to install his own plant. In speaking of the advantages of electric lighting on the farm, Mr. Matthews pointed out that the milk that was not spilled in the dairy, as the result of the installation of electric light, more than paid for the cost of the electricity used. Where electricity was used for driving the various machines and appliances on the dairy farm, it was possible to maintain 150 milking cows with three men.

The latest development in connection with the application of electricity for maintaining the supply of milk from the cows was the ultra-violet light treatment, which had already given excellent results. This was also used on the poultry farm for the elimination of rickets. By means of electric lighting in the poultry house a constant sleeping period of ten hours could be given to the birds in the winter-time, with the result of an increase in the production of from 10 to 50 per cent., and that at a time when eggs were highest in price. A clock was on the market and exhibited at the E.D.A. stand which would control the lights automatically without any trouble. In concluding, Mr. Matthews referred to the use of electricity in the light and heat treatment of bees, which brought highly beneficial results.

Dr. EKSTROM spoke on the "Value of electric energy to the farmer." In view of the high costs which were involved in the transmission of electric power, the purchase and installation of electrical machines and appliances, it was not to be wondered at that the farmer faced with hesitation the question of electrifying his farm. It was a fact that the average man could not on a long job produce a greater output than 1/10th h.p., yet the primary costs of electric supply were so considerable that the argument was inadequate.

Dr. Ekstrom visualised the supply of electricity to the village from a large modern "selected" generating station and distribution system. The energy was first supplied in bulk by the station to a distribution undertaking with selling powers for the area concerned, it being first received in secondary transformer stations where the pressure was raised to 20,000 or 30,000 V. From these sub-stations country lines radiated to the surrounding district and transmitted the e.h.p. energy to tertiary transformer stations where the pressure was reduced to 1,500 or 3,000 volts and distributed at that pressure by means of a local network. A quaternary substation further reduced the pressure to the working requirements, 220/127 V, at each consumer or group of consumers. The undertaker demanded a fixed annual charge for covering interest (6 per cent.), depreciation (4 per cent.), and upkeep and management (4 per cent.), total 14 per cent., of the primary transmission costs. For a farmer this charge was usually calculated in proportion to the acreage of arable land. A second charge was made depending on the consumption of energy and assumed to be at 1d. per kWh. Along these lines electricity would result in a saving to the farmer.

According to statistics compiled by the Swedish Social Board, the average farm in Central and Southern Sweden consumed about 40 gal. of paraffin, costing about £2. The consumption of electricity for lighting on such a farm would amount to 300 kWh, with much better illumination. As a prime mover the electric motor on the farm was ideal. It was ordinarily used in three sizes: 1 to 2 h.p. for the cow-sheds and stables; 2 to 5 h.p. for the barn machines; and 5 to 25 h.p. for threshing.

In no application of electricity were its advantages so evident as in the pumping of water. Water-pumping was one of the hardest and dullest tasks on the farm, requiring 290 hours' manual labour per year. For both chaff-cutting and grinding a saving of 75 per cent. in manual labour was brought about by the utilisation of electric power. The speaker showed that where electricity was available under the above conditions on a 75-acre farm the total annual saving in the running costs for the main farm operations, lighting, pumping, chaff-cutting, grinding, separating, milking, corn-crushing, and threshing, was about £34, the manual costs being £64. For a herd of 15 cows, each giving 500 gal. of milk per year, the manual labour amounted to 320 hours; electrical operation reduced this figure to 40. Further, the smoother running of the electrically-operated separator resulted in a better product; the financial gain from the electrical operation was £4. For the same conditions machine milking reduced the 1,250 hours of manual labour by one-half, which, allowing for the energy-consumption and machine-maintenance charges, resulted in a saving of over £7. In stressing the advantages of machine milking, Dr. Ekstrom pointed out that hand milking left much to be desired as regarded dairy hygiene, and consequently in the quality of the milk. At present in Sweden 13½ per cent of the cows were machine milked.

The saving for corn crushing by means of electricity on the 75-acre farm amounted to over £4, the figures being based on a stock of 4 horses, 15 cows, and 10 heifers. Where electricity was not available the crushing would usually be done in the nearest mill. Assuming that this was three miles away, the labour required for bagging, loading and unloading, and driving to and from the mill would amount to 90 hours. The total hours of manual labour required where electric power was used would be 60. Electrical threshing reduced the total labour from 355 to 270 hours, and the total costs from £13 to £8 13s., where an oil engine was previously used.

Assuming a partnership in a co-operative society for threshing, the total initial costs for the electrification of the 75-acre farm would amount to £145. Interest on this for depreciation at 12 per cent., plus the annual fixed charges of the supply undertaker, would amount to about £33, which would be more than covered by the financial gain calculated above. The total consumption for the farm was given as 1,223 kWh, and, including the annual fixed charge, £15 15s., the total cost per kWh amounted to 4d.

It was pointed out that the necessary transmission line would permit considerably over the 1,223 kWh to be transmitted without any appreciable increase in the fixed charges, so that energy in excess of this would be supplied at a total cost of about 1d. per kWh.

Advantage could be taken of this low rate by using electricity for many other operations, such as liquid-manure pumping, butter working, hoisting and conveying. Further, there was the important consideration of a continuous hot-water supply in the dairy for the washing of the machines and utensils. The use of the electric water-heater in the dairy would soon lead to its installation in the household, a sure step to electric cooking and the installation of the many other electric household appliances.

Mr. C. T. ALLAN, South Wales Electrical Power Distribution Company, said that in South Wales there were 50 electrified farms. He pointed out that the idea of applying electric light to the poultry-farming industry emanated from a Welshman in America.

The Electrical Exhibits.

As mentioned elsewhere in this issue, the display of electrical apparatus at the Royal Show was strictly limited as the result of no public electricity supply being available on the show-

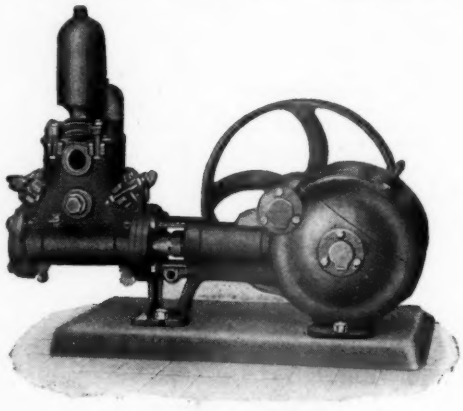


Fig. 1.—Boulton & Paul Pump.

ground. Nevertheless, a considerable effort was made by the manufacturers of agricultural machinery, apart from the comprehensive range of apparatus exhibited by the Electrical Development Association, which will be dealt with later, to give a general idea of the varied uses to which electrical power can be put on the farm. There were some 36 generating sets in use throughout the show, some of which were used as a means of supplying electric power for driving agricultural appliances. Further, many firms showed a wide range of electrically-driven appliances stationary.

The exhibits varied from the heavier types of apparatus used in farming operations, such as corn crushing, threshing, and

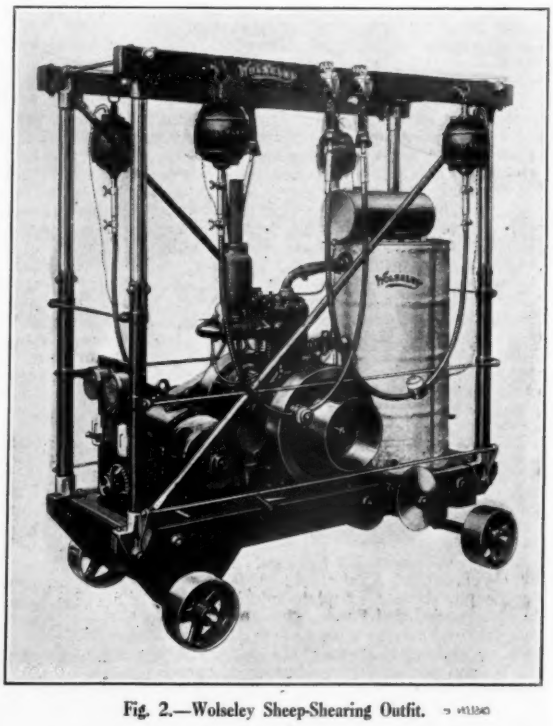


Fig. 2.—Wolseley Sheep-Shearing Outfit.

so on, down to the particularly wide field covered by the 1-h.p. or smaller motor.

Included in the latter, perhaps water-pumping plant is at any rate one of the most important items with which the farmer is concerned. Quite a number of firms displayed such apparatus, and a good example is a self-oiling electrically-driven pump which was introduced for the first time by Messrs. Boulton & Paul, Ltd. This apparatus is made up in three standard sizes with pumping capacities of 400, 800, and 1,600 gal. per hour. The driving motor, a.c. or d.c., varies from ¼ h.p. to 3 h.p., according to the water head which the pump is required to operate against. The pump, fig. 1, is double-acting, and the gearing is made up of a machine-cut

cast-iron wheel and a "fabrail" pinion. The pulley shown is replaced by a suitable gear wheel for the electric drive. The motor is of the protected type and is mounted on a cast-iron combination. In the case of a.c. the motor is equipped for direct switching and for d.c. the motor is fitted with a semi-enclosed started fitted with no-volt and overload releases.

Messrs. Boulton & Paul also showed an electrically-driven water elevator with a capacity of 10,000 gal. per hour. This is of the cell-construction continuous-belting type, and is driven by quite a small motor.

Another excellent example of the utility of electric power for a very small consumption is sheep shearing. A number of firms showed apparatus for this operation, including separate units for connecting to any convenient supply point, or complete combination sets, including the generating plant, for dealing with a number of sheep at one time. An example of the latter is shown in fig. 2, which illustrates such an outfit seen on the stand of the Wolseley Sheep Shearing Machine Co., Ltd. The whole apparatus is carried on a convenient low-wheeled truck designed to give the maximum portability. The driving unit is a 2½-h.p. petrol engine which is coupled to a 1-kW dynamo. Four sets of shears are supplied with the plant, each complete with its own tiny driving motor and flexible coupling. By means of a specially-designed resistance secured to the front of the truck, the shearing speeds can be varied.

(To be continued.)

Correspondence.

Correspondents should forward their communications* as early as possible.** ***No letter can be published unless we have the writer's name and address in our possession.

Wireless as a Station Load.

Some time ago you were good enough to publish my plea for the development of the wireless receiver as a useful load.

One small (d.c.) station has in the meantime installed four units at a cost of £14 to the consumers, plus £7 odd orders for wiring. The net profit is about £5 on the total. The additional load (entirely "off-peak") is worth 10s. per month.

The consumers actually save 10s. per month on the l.p. and £1 per month on the h.p. supplies, apart from the trouble of carting batteries about. The figures are small, but they are a guide as to what is possible, even when the whole of the work is given to an outside contractor.

In my previous letter I did not refer to a.c. supplies; but in view of the widespread idea that units for a.c. *must* be expensive with transformers and special valves, I must state that transformers are not generally necessary; in fact, many transformers take 40 watts, or more, at a bad power factor (one I have tested took 60 watts).

I shall be very pleased to give the necessary technical information to interested readers, but would state here that it is only necessary to run a valve in series with a 30-watt room light and draw the h.p. off the grid and plate through the usual smoothing unit as used for d.c. The extra cost to the consumer for his h.p. supply is only the cost of running a 30-watt lamp (0.2d. per hour) when it would not otherwise be in use, and this cost naturally only arises in the summer.

This is a unity-power-factor load. The consumer gains in that his 18s. battery lasting, say, 500 hours, costs about 0.4d. per hour, as against 0.2d. per hour for the light during the summer only, which is nevertheless useful to the station.

But the advantage to the station comes in the charging device in which, with two small modern valves and 4 D.T.h. cells, we can run the h.p. for less than half the usual cost, and yet this revenue is direct to the station as an entirely non-peak load. Figures have been widely published showing the profits on accumulator charging and here is a chance for "the chief" to make a profit both on the installation and on the running of the units.

Ernest J. Baty.

Luton, *July 5th*, 1927.

Resonance in Transmission Lines.

In the recent discussion on Mr. Wm. C. Bexon's paper read before the I.M.E.A. and reported on at length in your issue of June 10th, a statement was made by the opening speaker, Mr. J. W. Burr, which might seriously mislead users of synchronous motors.

In an endeavour to explain the breakdown troubles experienced with certain h.p. lines, Mr. Burr states that "The faults might be due to resonance in the line," and proceeds to explain that in all transmission systems containing induction and synchronous motors "The conditions might be favourable to resonance," and that "It might, of course, be that the supply authorities were asking for trouble by offering a reduction in the price of electricity supplied at a high power factor, particularly if a bonus were allowed for leading wattless components."

The conditions favourable for resonance certainly exist in all transmission lines, as Mr. Burr remarks, but these conditions have no connection with and are not affected by the use of the synchronous type of motor, or by the presence of a leading wattless component in the supply.

As is well known, for resonance to occur the condensive reactance of the system must equal the inductive reactance at the particular resonant fundamental or harmonic frequency. As oscillation of energy then takes place between the electrostatic field of the condensive reactance and the magnetic field of the inductive reactance, the flow of current is liable to produce local high pressure. The synchronous motor, however, though termed a synchronous condenser, is not a condenser, possesses no electrostatic field similar to that of a condenser, and cannot in practice co-operate with the inductance of the other parts of the system to produce the oscillation described above.

The truth of these remarks is amply borne out by the large number of installations in this country and abroad on which synchronous motors are successfully used and no trouble is experienced from transmission line breakdown. In a case in this country a network of some 60,000 kW is actually operating at a leading power factor.

C. Scott Ruffle, A.M.I.Mech.E.

Ex R.E. Officer i/c Electrical and Mechanical Services, Hinaidi Cantonments, Iraq.

Coneyhurst, Surrey, *July 6th*, 1927.

Total Eclipse of the Sun—June 29th, 1927.

Although outside the province of the work of this Bureau, I considered that this event was of very considerable interest to all illuminating engineers, and therefore arranged to obtain some intensity readings at several places. These are detailed in the attached table. [Here condensed.—EDS.]

Southport.—Observer, Mr. J. E. Guthrie Oliver. Instrument used, F.C. Meter No. 6592:—

Time a.m.	Foot-candles.	Remarks.
6.0	80	Slightly obscured.
6.20	20	—
Before totality	7	—
Totality	.02	—
After totality	5	—
6.30	60	—

Wallasey.—Observer, Mr. Eastman. Holophane Lumeter:—

6.0	100	—
6.20	30	First glimpse
6.23	5.5	of sun 6.45.
6.24	1	—
6.25	3	—

Burnage (Manchester).—Observer, Miss G. E. Jones. F.C. Meter 6074:—

6.8	45	Cloudy
6.22	1	all the
6.25	.5	time.

Didsbury (Manchester).—Observer, Mr. R. C. Hawkins. Holophane Lumeter No. 474, F.C. Meter No. 6768:—

	Foot-candles. (F.C. Meter.)	Foot-candles. (Lumeter.)
6.10	90	100
6.20	6.5	6
—	4	4
6.25	—	3
6.30	20	20
6.35	57	60

Unfortunately the climatic conditions were most unfavourable, as in Manchester and Wallasey the sun was not visible until after the eclipse period, and very low drifting clouds caused constant variations in illumination intensity.

The low figure of .02 foot-candle at totality, recorded at Southport, is most interesting. Although the lowest reading at Wallasey, which was just inside the totality belt, was 1 foot-candle, that recorded by Miss Jones at Manchester, which was outside the totality belt, was extremely low. My own readings at Didsbury (Manchester) are not as complete as one would desire, as I seem to have missed the crucial reading. However, it must be appreciated that great variations occurred in an extremely short period of time, which made it impossible to obtain all the readings desirable. At the actual period of totality the illumination remained constant for about twenty seconds at Southport and only about one or two seconds at Manchester.

I should like to express my appreciation of the very hearty co-operation of the three other observers.

R. C. Hawkins,

Electric Lighting Service Demonstration Bureau,
Manchester, *July 5th*, 1927.

The Truth.

I was interested to see in your correspondence of the current issue, a little ignorance under the heading of a "Fact." This episode you might head "The Truth."

A certain person who is styled "Electrical Engineer and Contractor" was called to see a country-house lighting set; he found that the bearings were down, to the extent that the binders had fouled the pole pieces.

Remedy No. 1 was tried; he simply cut the binders off, and

tried to get away, but "nothing doing," as the armature was fouling.

He then took the end bells off the dynamo, and took the sizes of the bearings. He obtained the new bearings from a local firm of *excellent repute*, and asked one of my assistants to help him to fix the job up again. They went to the house, and when the bearings were tried on the armature shaft, it was found that they were too small by ¼ in. My assistant asked him how he took the size of the shaft, and he replied: "With a pair of callipers." "What size was it?" my assistant asked. "Oh," replied the "electrical engineer," "*I took them the callipers.*"

I have obtained my assistant's signature to this in addition to my own as a sign of good faith.

I trust this may be brought before the public, who ought to be protected from such highly intellectual genius. I am expected to be certificated for my humble post, and I think it is a burning shame that any person can call himself an "electrical engineer."

"Ignoramus."

July 4th, 1927.

Applications to be Accompanied by Fees.

The enclosed application form (with particulars) is for an appointment advertised in the ELECTRICAL REVIEW. I am sending it for you to see the first condition thereon, on which my comments follow, requiring applicants to send 7s. 6d. with their applications.

You will note that this is not called a deposit, and that there is no suggestion that the fee is returnable under any circumstances. Such a fee is understandable in the case, for instance, of tenders, where a contractor has to be supplied in return for it with costly information; but it is returnable on receipt of the tender. If it is returnable at all in the present case, there seems no reason for asking for it. One therefore asks what an unsuccessful applicant gets for his money. If such a fee can legally be asked for the privilege of having one's application considered, it seems a particularly easy way, open to anybody, of making money. There is, of course, no obligation on the advertisers to appoint any particular applicant, therefore none need be appointed. They can then advertise again and haul in another lot of seven shillings and sixpences, and so on.

What, therefore, is to prevent anyone advertising a tempting post, get the money, and appoint nobody to it? Unsuccessful applicants would, as usual, hear no more about it, and if it were discovered that no one was appointed, there is the safe answer that none was exactly suitable for it.

As I said, if it is legal, there are fine possibilities (for the advertiser), especially with an address out of this country.

X.

July 5th, 1927.

[The advertiser in this case, as shown in the advertisement and in the application form, is a department of a national government, the *bona fides* of which is not in doubt. There can be no question of legality in demanding that a fee shall accompany a formal application, as the applicant is under no compulsion to pursue his inquiries or to send any money; but, as our correspondent points out, the practice is open to abuse, and in our opinion, where such a stipulation is made, the applicant should not part with cash until he is satisfied with regard to the advertiser's good faith.—EDS. ELEC. REV.]

The Late Herr Bergmann.

The passing of Sigmund Bergmann reminds me of a conversation I had with him about 1892. Sitting in the Savoy Hotel in Berlin, the conversation turned on Bergmann's early association with Edison.

I have in my possession Bergmann's card on which is a sketch he made showing his idea of a carbon microphone. He evolved the idea in Edison's works, fastening two plates to a piece of wood, sprinkled granules of carbon over the edges of the plates, which were not touching. With this idea, no doubt somewhat elaborated, he went to Edison, who, in his cautious manner, looked at it and turned it over in his mind.

I cannot recall all the quaint expressions which Bergmann said Edison used, but he thought so very much of it that he departed from his strict rule not to work on Sundays, and arranged through influence to work the telegraph line between New York and Boston. The result was exceedingly satisfactory and, as Bergmann put it, he at once seemed up in the skies. He had visions of wealth, and could see what he thought to be the end of his poverty and troubles.

Shortly afterwards (if I remember rightly, it was the next day) Bergmann went to Edison, and I think I cannot do better than repeat the conversation as it was told me:—

"Well, Bergmann, you seem to have got something great. Are you strong? You have got to be very strong this morning."

Bergmann explained to him that he was in a very good state of health, and for the moment was nonplussed as to why the extra strength was required.

"Well, Bergmann, you just go round to the bar and get a good drink of rye whisky."

Bergmann obeyed his chief's injunctions and returned.

"Well, have you had the whisky? Sure—then let me smell your breath."

Bergmann naturally was completely nonplussed at these short obscure remarks of Edison's, but soon learned, much to his discomfort, that Bell had patented exactly the same thing only a little while before, and Edison showed him the record of the application. One can only judge of the chagrin of Bergmann, when all his castles in the air vanished.

Bergmann continued his conversation with me, and having still a little of the curt American way of talking in him, wound up by saying "It *was* a blow."

It is not likely that any record of Bergmann's invention can have come to light as, of course, although a healthy child, it was bound to die so far as Bergmann was concerned a few days after proving itself so satisfactory.

John Place, M.I.Mech.E., A.M.I.E.E.

London, *July 8th*, 1927.

Electric Lamp Prices and Competition.

I was much interested to read in your last issue the London County Council's complaint *re* the supply of electric lamps.

As a shareholder in a British firm of electric lamp manufacturers not controlled by the Combine, I would point out that the London County Council has only itself to thank for its inability to obtain competitive prices for electric lamps.

It has been brought to my notice that the company I am interested in has been refused permission by the Council to tender for the supply of electric lamps to it, although very competitive prices could have been quoted. When the Council was asked for a reason for this refusal no explanation was given.

There can be no doubt of this firm's ability to supply electric lamps to the Council's specification, as the company has, in the past, supplied, and is now supplying, lamps under contract to several large public bodies.

If the other manufacturers outside the Combine were treated in the same manner, it is obvious that it is useless to suppose that the London County Council would be able to get competitive prices, if only members of the same Combine were invited to tender.

K. E. Paine.

London, *July 8th*, 1927.

The I.E.E. Wiring Regulations—Abridged Edition.

With reference to your editorial note of June 24th, it may be of interest to know that the Association of Supervising Electrical Engineers also takes the view that it is too much to expect a wireman or any other operative to be *au fait* with all the I.E.E. Wiring Regulations, particularly as many of the Regulations do not apply to the operative's work. Some are purely manufacturing details and do not affect the operative in any way, while it is questionable whether operatives generally could interpret some of the Regulations.

With a view to meeting the position, the A.S.E.E. has compiled an abridged version of the 9th edition of the Regulations under the title of "The Employés' Guide," which should prove of much assistance to employés in the electrical industry. Diagrams and explanatory notes are included, and rules with which the employé is not concerned have been omitted.

This abridged edition has been compiled from the employés' standpoint, and in view of the many years of practical experience of members of this Association, the book should be a useful work.

Permission to publish has been granted by the Institution of Electrical Engineers, and "The Employés' Guide" will be on sale about the 25th of this month—paper covers, price 9d. (post free 10½d.), and cloth bound 1s. 6d. (post free 1s. 8d.).

A. Brammer,
General Secretary, A.S.E.E.

London, *July 7th*, 1927.

Electrical Development and Publicity.

In your issue of to-day you give some details of the W.O.B. campaign. I notice that in London and the Home Counties, containing a population of at least 10 million people, there were only 150,000 visitors to see things electrical. Only 150,000 could be got to evince any interest, out of all those ladies one sees crowding the pavements of Oxford Street all day, looking at drapers' shops!

More people enter a well-known drapery store *in one day* than this.

Out of 10,000,000 homes in the country, only 162,500 were interested sufficiently to enter the competition.

What is wrong? Why all this apathy about electrical matters?

Is it not that adequate publicity—and the right sort of publicity—has never been given? The E.D.A. has not got the funds. It needs as much money as that expended by the makers of Kruschen salts and Palmolive soap, and it must be spent in exactly the same way. The tried and proved methods of publicity are the only ones worth following. The spasmodic efforts of the E.D.A. up to the present are wrong methods. Continuous

hammering away in national journals, and the other known ways, proved again and again by publicity men, are the only methods which will change apathy to interest.

People are keen enough about wireless: the publicity people of the various manufacturers see to that. It is not in more or less obscure electrical shops or in provincial journals that the electrical tale must be told; it is in journals with big circulations, on the hoardings, on the railways. This costs money.

The whole electrical industry manages to muster up about £30,000 a year in order to broadcast the electrical tale to 45 million people. Do you not pity the E.D.A. struggling to popularise electricity on that sum? It would only just launch a new toffee.

The W.O.B. campaign results, if impartially considered, will serve to illustrate the above remarks. The vast majority of people never even heard of it.

R. E. H. Lovelace,
Director, FACTUM, LTD.

London, *July 1st*, 1927.

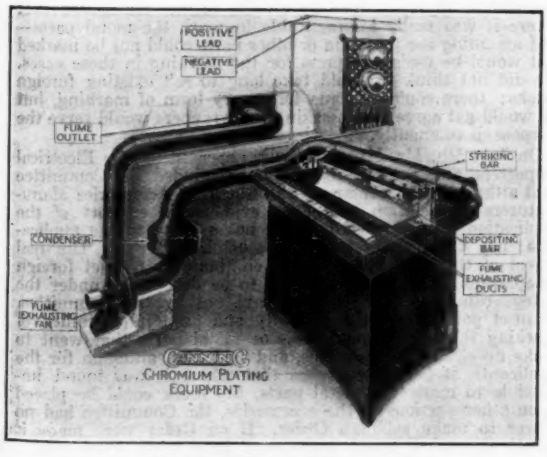
Chromium Plating.

Some particulars received from Messrs. W. Canning & Co., Ltd.

THE early claims and hopes in connection with chromium plating were not at first realised, and up to quite recently the practice seemed disappointing. It is important to note, however, that the intensive researches of the past few years have radically altered the position. Chromium plating is now a commercial fact, and the plant can be installed and operated with every expectation of success, provided, of course, that care is taken to choose the process after actually seeing it in operation.

The improvements that inspire confidence in the process are both chemical and mechanical in nature. The vats and exhausts have been much improved, and the operation can now be conducted in an atmosphere free from the particularly noxious and objectionable spray of the early days. The conductivity of the solution, though still low compared with other plating solutions, has been improved, and any but deeply recessed articles can be hung in the bath without fear that they will not "cover." The polishing and finishing of a dull chromium deposit, even with the best apparatus and materials, is a laborious business, and the fact that a deposit can be obtained brilliant enough to require little or no subsequent polishing is a great asset—particularly so in certain special classes of work.

Probably, however, the greatest improvement lies in the certainty of the process. A few years ago a chromium solution was the most tricky and elusive one imaginable; it would



A Chromium Plating Outfit.

work beautifully on Monday evening, but on Tuesday morning—for no ascertainable reason—it would refuse to give any deposit at all, on any provocation. This impossible behaviour is now happily met and conquered, and the solution can be expected to give uniform results and service. It still cannot be said that chromium is a preventive of rust when it is deposited directly on to iron and steel. Theoretically it should be, and if a deposit is obtained that is impervious to damp and the atmosphere, it emphatically is so, but the average deposit permits damp to attack the under metal and encourages the iron to rust even more quickly than the bare metal would have done. The best results with chromium are obtained on brass, and since the plate is untarnishable and retains its lustre indefinitely, it particularly appeals to the housewife on all utensils and domestic fittings that are usually of that metal. Ordinary soap and water only are required to clean the plated articles. In addition to water and gas taps, lavatory, bath, electric, gas, ship and hotel fittings, and many other articles, such as spoons and forks, are now being successfully treated. Chromium-plated fittings will inevitably be part of the "labour-saving house," and there is a huge commercial field to be exploited in this connection. Motor fittings, in brass, look extremely well plated with this metal, and it may be that the chromium plating of cycle and motor parts will be an important development. Steel surgical instruments that are constantly being sterilised and cleaned should also prove a field for the process.

The remarkable hardness of chromium is not the particularly great asset in the finished article that it might be expected to be. The actual deposit is so thin that the softness or hardness of the under metal is hardly modified by the plating. The cost of the process is generally estimated to be about five times that of nickel plating, but the cost is not so important as it may seem, since the plated articles can, by reason of their longer life, enormously increased utility, beauty and convenience, command higher prices and a ready sale. Chromium equipments are being steadily installed and the finished articles are appearing on the market in constantly increasing numbers and variety. The accompanying illustration shows a complete chromium-plating outfit supplied by Messrs. Canning and Co., with the principal features indicated.

The I.E.E. Conversazione.

Faraday Medal Presentation, and a Lighting Spectacle.

THE annual conversazione of the Institution of Electrical Engineers was held on Thursday evening, July 7th, at the Natural History Museum, South Kensington. Following the reception by the president, Dr. W. H. Eccles, F.R.S., and Mrs. Eccles, who were supported by members of the Council, Dr. Eccles presented the Faraday Medal to Dr. Elihu Thomson, hon. member, pointing out in the course of a short speech that the medal was instituted in 1921 to commemorate the fiftieth anniversary of the first ordinary meeting of the Institution. It was awarded by the Council for notable scientific or industrial achievement in electrical engineering, or for conspicuous service rendered in the advancement of electrical science, without restriction as regards nationality, country of residence, or membership of the Institution. Every electrical engineer would agree that Dr. Thomson fulfilled the conditions ideally; besides his eminence on the industrial side of electrical engineering, he had contributed to an outstanding degree to their knowledge of electricity. Altogether, his patented inventions numbered over 700, and those he had not patented probably many more.

Dr. Elihu Thomson received the medal and briefly expressed his appreciation of the award, incidentally remarking that he hoped to be in England again in about three years' time.

Light refreshment was served during the evening, and the string band of the Royal Engineers rendered a programme of music and also provided the orchestral accompaniment (directed by Lieut. Neville Flux, F.R.A.M.) to a spectacular performance designed to illustrate "Light Down the Ages, or the Taming of Electricity" in a series of nine episodes, of which the following is a brief description:—

In the early days, needing warmth and light, man kindled fire by rubbing two pieces of dry wood together, and lighted rude torches, but the unknown forces of nature were stronger than the cunning of man and the rain storm quenched the light he had kindled with such toil—Electricity, with his lightning and thunder, clamoured outside.

In the time of the Pharaohs, man learned to use the rays of the sun, which he focused with a disk of polished steel, so that the concentrated rays ignited the fire of sacrifice; but again Electricity showed his unbridled power.

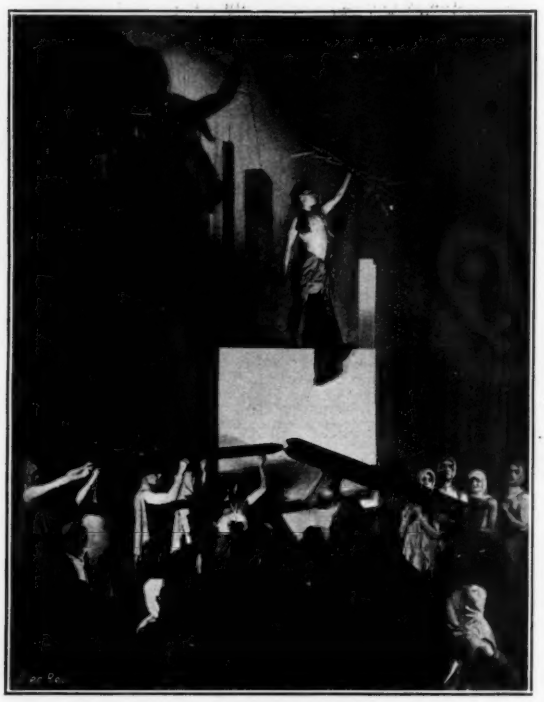
To the Grecians, light became a sacred gift and the Vestal Virgins guarded the sacred flame, lighting their oil lamps at it to show light to the people; again Electricity protested.

In Georgian days the streets were lighted by flaming torches carried by linkmen, and candelabra with waxen tapers lighted the entertainment of the rich; but Electricity again showed his might, and his storm plunged the crowd into darkness.

The Victorians devised oil lamps, and the whist parties of those crinolined days were lighted by their warm glow. Then Electricity summoned all his might and, with his lightning, showed the futility of any other light but his. Suddenly, through the tumult of the storm Electricity himself appears, commanding in his gleaming strength: the crowd of the past stretch out their arms to him crying, "Give us light," and through the crowd, surging with prejudice and ignorance, Humphrey Davy jostles his way to demonstrate Electricity's gifts to man. As he experiments, come the figures of Positive and Negative with their attendant amperes and volts bearing two huge carbon pencils which Positive and Negative direct towards each other so that the points ignite (see p. 126). This first great taming of electricity into light is brought to the mind of Davy and through his inspiration the Thames embankment is lighted in 1870 by arc lamps.

Then Electricity summoned Joseph Wilson Swan in 1880 to deliver a lecture on the subject of the sub-division of light at the Institution of Civil Engineers before the Society of Telegraph Engineers, and at the Crystal Palace Exhibition, in 1882, was shown a chandelier of many carbon-filament lamps, with their one candle power to each four watts.

In 1906 once more Electricity challenged man to make use of him, and the Parsons steam turbine was evolved to drive a generator which energised the metal-filament lamp in the shop window with its fantastic display of the period, with one candle power to each watt: but Electricity showed that there was another force of nature waiting to be harnessed by man,



The Ballet of the Carbon Arc.

and so the torrent was confined by dams and its power used to generate electricity which was carried across spaces by means of high-pressure cables supported on towers of steel framework. By means of gasfilled lamps, with their two candle power for each watt, modern lighting became possible, with its surprises of blatancy and beauty: but what then of the power of Electricity with his marvels of light?—the mighty had fallen before the switchboard.

The spectacle was devised by Major W. R. Creighton, M.C., assisted by Messrs. W. M. Hill, J. C. R. Durran, and A. Hankey, in collaboration with a committee of the I.E.E. comprising Dr. W. H. Eccles, chairman, Mr. W. E. Bush, and Mr. A. J. Makower, all of whom are to be congratulated on the result of their enterprise. The costumes (by Andrew Storie), scenery (by Marc Henri), and equipment for producing the striking lighting effects, were provided by the Electric Lamp Manufacturers' Association of Great Britain, and the stage wiring was carried out by the Strand Electric and Engineering Co., Ltd., under the direction of Mr. Applebee. A special tribute is due to those of the staffs of members of the E.L.M.A. who generously gave their services as performers.

The Marking of Imported Fittings.

Merchandise Marks Committee Inquiry.

AN application for an Order in Council, under the Merchandise Marks Act, 1926, requiring that imported electric lamp holders, wall plugs, switches and similar household fittings, and a number of other (non-electrical) articles, should bear an indication of their origin, was the subject of an inquiry by a Standing Committee which opened on July 4th at the Board of Trade Offices.

The application was made by the Brass Founders' Employers' Association and the National Brass and Metal Mechanics' Society—the latter a trade union. There was opposition by the Electrical Importers' and Traders' Association.

Mr. KEEN, opening the case for the applicants, said that reference to parts was included because they wished to circumvent the danger of parts of articles being imported separately, assembled here, and sold complete. With regard to electrical apparatus, the applicants would be satisfied if the Order covered electric lamp holders, wall plugs, tumbler and other switches, ceiling roses and distribution fuses, and metal parts of any of these. The articles included in the application were all made on a large scale in this country; they were articles in which labour costs constituted a considerable proportion of the total cost of production, and in which there was competition which British manufacturers found difficult to meet. British designs and patterns were copied abroad, and it was difficult to distinguish between the British and foreign articles. The competition came specially from Germany and Holland, and the existing state of affairs was likely to produce serious results to manufacturers and workers unless it could be successfully met. They asked the Committee to recommend an Order providing that the indication of origin should be cast, stamped or punched on some conspicuous part of the article. With regard to the marking of goods composed partly of metal and partly of other material, such as china or wood, as in the case of electrical fittings, they asked that a metal part imported separately should bear an indication of origin, but they did not ask that a non-metal part, sold separately, should be marked. Such marking would prevent foreign goods being imported without a mark, sold wholesale in this country, and re-exported as British goods. The objectors, said Mr. Keen, maintained that the electrical articles mentioned in the application were usually sold to electrical contractors in wrappings, which could be marked if necessary. It was also stated that marking would disfigure certain articles and that the application was a deliberate attempt to suppress imported goods and destroy the purchasers' free market. That was a complaint against the policy of the Act, which provided that the goods were to be marked in a conspicuous manner. He submitted that the marking could be carried out without disfigurement. The objectors had also stated that the contractor was well able to distinguish foreign from British goods, so that there was no need for marking. The applicants, however, were not content with that; the Act contemplated an indication of origin to all purchasers.

Mr. R. G. E. FREEMAN (Director of the Brass Founders' Employers' Association) said that the home production of the articles to which the application related was considerable, and provided employment for a good many thousands of workpeople. In many cases foreign articles were made to British patterns specially for the British market. A considerable proportion of the goods were not sold in parcels, so that the marking of the wrappings would not serve.

Mr. F. J. COLLIS, secretary of the Electrical Accessories Manufacturers' Association, gave evidence in support of the application. He said that his Association at present represented only about 20 per cent. of the accessories manufacturers in this country, but steps were being taken to alter the constitution in order to attract more members. At the same time, he claimed that his members represented over 60 per cent. of the volume of trade done by British firms. He agreed that where it was really impracticable to mark the metal parts—and assuming the porcelain or other parts could not be marked—it would be useless to press for the marking in those cases. He did not think it would take long to sell existing foreign stocks; there could be some temporary form of marking, but he would not agree that marking the wrappers would serve the purpose permanently.

On July 5th, Mr. MACASKIE, who appeared for the Electrical Importers' and Traders' Association, reminded the Committee that although the secretary of the Electrical Accessories Manufacturers' Association had given evidence in support of the application, that Association was not a party to the application, nor did its secretary speak officially for it. The real object of the application was to eliminate or restrict foreign competition. That was a matter to be dealt with under the Safeguarding of Industries Act and not by the Committee. Counsel pointed out the difficulty and even impossibility of marking the many small brass or metal parts that went to make up electrical accessories, and said that, although for the applicants, it had been stated that where it was found impossible to mark the metal parts, the mark could be placed upon other portions of the accessories, the Committee had no power to make such an Order. If an Order were made it would inevitably injure trade at a time when there was a demand that fittings and accessories should be available at the cheapest possible prices. A wrapper would amply meet the case, because all that was necessary was to call the attention of the buyer at the time of purchase to the origin of the goods.

The hearing was concluded on July 8th. Evidence was given against the application by Mr. A. H. Morris (Buchanan and Curwen), Mr. J. McKay (secretary of the Electrical Wholesalers' Federation), Mr. C. H. Phillips (Sun Electrical Co., Ltd.), Mr. H. M. Harris (Harwell, Ltd.). Mr. Macaskie summed up the case against the marking of the fittings, and Mr. Keen replied for the applicants. The Committee's decision will be promulgated in due course.

A report of the last stage of the proceedings will appear in our next issue.

Published Specifications.

Compiled expressly for this journal by a firm of Chartered Patent Agents. The numbers in parentheses are those under which the specifications will be printed and abridged, and all subsequent proceedings will be taken.

1926.

933. "Alternating-current rectifying devices." S. Ruben. January 12th, 1926. (272,568.)

4,566. "Electric contact making devices." O. Nagy. February 21st, 1925. (247,961.)

5,988. "Electromagnetically-operated indicating instruments or relays." General Electric Co., Ltd., and A. E. Angold. March 3rd, 1926. (272,574.)

6,748. "Magneto-electric machines." M-L Magneto Syndicate, Ltd., and J. A. Laird. March 11th, 1926. (272,583.)

6,839. "Induction apparatus particularly for ignition purposes." E. Von Lepel. October 29th, 1925. (260,539.)

6,964. "Method of increasing the electric insulating properties of cotton fibre and like insulating materials." London Electric Wire Co. & Smiths, Ltd., and E. L. Wildy. March 12th, 1926. (272,587.)

7,123. "Electric water-heaters." E. C. Steere. March 19th, 1925. (249,514.)

7,147. "Alternating-current distribution systems." British Thomson-Houston Co., Ltd., and F. A. Haigh. March 15th, 1926. (272,593.)

7,164. "Electrical measuring devices." B. Dunglinson (Republic Flow Meters Co.). March 15th, 1926. (272,594.)

7,183. "Telephone apparatus." Standard Telephones & Cables, Ltd., and G. H. Nash. March 15th, 1926. (272,595.)

7,184. "Telegraph circuits." Standard Telephones & Cables, Ltd., and A. E. Thompson. March 15th, 1926. (272,596.)

7,335. "Loud-speaking telephones." H. D. Arnold. March 16th, 1926. (272,601.)

7,433. "Type-printing telegraphy." Morkrum-Kleinschmidt Corporation. November 11th, 1925. (261,830.)

7,460. "Intercommunication system for printing telegraph stations." Standard Telephones & Cables, Ltd. (Western Electric Co., Inc.). March 17th, 1926. (272,612.)

7,574. "Electrical apparatus boxes." K. J. Jungholm. March 18th, 1926. (272,617.)

7,745. "Damping and controlling electrically-operated acoustic, sound-recording, and like vibration devices." A. F. Sykes. March 20th, 1926. (Cognate application 17,999/26.) (272,622.)

7,876. "High-tension accumulator battery." G. Reinstrom. March 22nd, 1926. (272,625.)

7,878. "Machine for jointing electric cables." D. M. Simons and F. D. Barbour. March 22nd, 1926. (272,626.)

7,891. "Telephone systems." Automatic Telephone Manufacturing Co., Ltd., and J. E. Ostline. March 22nd, 1926. (272,628.)

8,901. "Apparatus and methods for measuring electric quantities." Siemens Bros. & Co., Ltd., and A. Rosen. April 1st, 1926. (272,646.)

9,643. "Selective-call signal system for party-line telephonic installations." G. L. Nawiashsky. April 12th, 1926. (272,650.)

10,411. "Thermostat for breaking an electric circuit when a predetermined temperature or current is varied." M. Paul. April 22nd, 1925. (251,275.)

10,622. "Incandescent electric lampholders." British Thomson-Houston Co., Ltd., and H. C. Wheat. April 22nd, 1926. (272,653.)

12,307. "High-frequency power supply for electric furnaces." C. Lorenz Akt. Ges. May 13th, 1925. (Addition to 247,949.) (252,183.)

12,592. "Means for reducing the effects of atmospheric and the like disturbances in the reception of wireless telegraphy." Siemens & Halske Akt. Ges. May 16th, 1925. (252,202.)

12,808. "Electromagnetic sound-reproducers or loud-speakers." Brandes Laboratories, Inc. October 2nd, 1926. (259,178.)

12,922. "Starter drives for internal-combustion engines, particularly of automobiles." W. C. Starkey and L.G.S. Devices Corporation. May 20th, 1926. (272,667.)

13,207. "Polyphase high-frequency current-convertor." Wired Radio Inc. October 27th, 1925. (260,547.)

13,238. "Device for locking electric lamps in their holders or sockets." J. W. Wyatt, J. Wilson, and J.K.W. Manufacturing Co., Ltd. May 25th, 1926. (272,670.)

13,258. "Tuning-coils for use in wireless telephony and telegraphy." J. M. Nemerovsky. May 25th, 1926. (Cognate application 20,124/26.) (272,671.)

14,555. "Electric heating devices." British Thomson-Houston Co., Ltd., and F. W. Leevers. June 9th, 1926. (Addition to 245,846.) (272,676.)

14,808. "Folding carrier for electric accumulators and the like." H. F. Loveland. June 11th, 1926. (272,680.)

15,395. "Telephone transmitters." M. Graham, A. Graham (legal representatives of E. A. Graham, deceased), and L. H. Paddle. June 18th, 1926. (Addition to 257,309.) (272,684.)

17,313. "Grid leaks or the like for wireless telephony and telegraphy." R. Woods. July 10th, 1926. (272,698.)

18,957. "Manufacture of flexible coil sockets, particularly for marine cables." Siemens-Schuckertwerke Ges. July 31st, 1925. (256,253.)

19,230. "Electric switches." British Thomson-Houston Co., Ltd. August 26th, 1925. (257,583.)

19,336. "Thermostatic electric switches for controlling refrigerating systems." A. A. Kucher. November 4th, 1925. (260,949.)

19,478. "Electric transformers." International General Electric Co., Inc. August 6th, 1925. (256,637.)

19,791. "Electric cooking stoves." G. W. K. Harwood. August 11th, 1926. (272,716.)

20,023. "Regulators for variable-speed dynamo-electric machines." International General Electric Co., Inc. August 13th, 1925. (256,988.)

21,224. "Electrical transformers." A. J. Stevens & Co. (1914), Ltd., and H. C. Willson. August 28th, 1926. (272,721.)

22,185. "Electrical air condenser of variable capacity." V. Saushkin. September 8th, 1926. (272,724.)

22,646. "Thermionic discharge tubes." British Thomson-Houston Co., Ltd. September 14th, 1925. (258,298.)

22,877. "Electric lampholder." P. Krageloh. September 16th, 1926. (272,728.)

23,394. "Metal-sheathed electric conductors." Callender's Cable & Construction Co., Ltd., and T. Petersen. September 22nd, 1926. (272,730.)

25,167. "Electromagnetic sound-reproducers, such as loud-speakers." Brandes Laboratories, Inc. July 16th, 1926. (272,738.)

25,309. "Spark plug." E. C. R. Marks (Champion Spark Plug Co.). October 11th, 1926. (272,739.)

25,532. "Electric batteries." F. J. Dietz and E. Hibou. March 29th, 1926. (268,283.)

25,966. "Electric lighting and starting machines for motor vehicles." Soc. de Paris et du Rhone. July 8th, 1926. (Addition to 262,064.) (272,747.)

26,347. "Electromagnetic units for operating the diaphragm of sound-reproducing devices." Lee de Forest. Ltd. October 24th, 1925. (260,286.)

27,960. "Impulse transmitters for automatic telephony." S. Pastor. November 6th, 1926. (272,757.)

28,045. "Incandescent electric hand lamps, primarily intended for road traffic signalling, but applicable also for other usages." R. J. Rodd. November 8th, 1926. (272,758.)

29,473. "Electric heat-accumulating ranges." M. Hedlund. November 22nd, 1926. (272,767.)

29,495. "Electromagnetic sound-reproducers such as loud-speakers." Brandes Laboratories, Inc. July 15th, 1926. (272,768.)

29,607. "Electric locomotives." International General Electric Co., Inc. November 23rd, 1925. (261,800.)

29,864. "Electric drive of paper machines." Akt. Ges. Brown, Boveri and Cie. November 26th, 1925. (262,123.)

31,155. "Mechanism for opening and closing taps or electric switches at predetermined times." J. Gunning. December 8th, 1926. (272,776.)

31,849. "Method of treating absorbent materials to render them stronger, more highly electrically insulating, waterproof, and rot-proof." T. L. Allison and B. Brown. December 16th, 1926. (272,781.)

32,181. "Electric furnaces." British Thomson-Houston Co., Ltd. December 24th, 1925. (263,792.)

32,217. "Electric switches for valve-operating mechanism." W. B. Dale, R. A. Hopkinson, and Hopkinsons, Ltd. December 20th, 1926. (272,782.)

32,631. "Vapour lamps or lanterns for lighting and other purposes." A. C. Jones and O. Manley. December 24th, 1926. (272,783.)

1927.

55. "Wireless telegraphy and telephony." Marconi's Wireless Telegraph Co., Ltd. January 2nd, 1926. (263,876.)

108. "Alloy of high specific electrical resistance unoxidisable at a high temperature." Y. Kamishima. January 3rd, 1927. (272,788.)

1,458. "Thermionic-valve circuits." A. F. Pollock and D. A. Pollock. January 18th, 1927. (272,797.)

1,686. "Electric heating cable." Aktieselskabet Skandinaviske Kabel-og Gummifabriker and H. Olsen. June 5th, 1926. (272,166.)

1,850. "Apparatus for electrolysing solutions of alkali metal chlorides." E. Krebs. January 23rd, 1926. (264,865.)

2,190. "Pocket electric lamp." A. E. O'dell (Elektrotechnische Fabrik Schmidt & Co., Ges.). January 25th, 1927. (272,804.)

2,727. "Electric arc lamps." Dr. C. F. Von Siemens, Dr. H. Von Siemens and Dr. A. Franke. March 29th, 1926. (268,298.)

4,504. "Sparking plugs and electric ignition systems for internal-combustion engines." J. de Coster. (Addition to 262,420.) September 11th, 1926. (272,813.)

5,047. "High-frequency thermionic transmitting devices." Telefunken Ges. für Drahtlose Telegraphie. February 23rd, 1926. (266,722.)

6,107. "Electrolytic apparatus more particularly adapted for the electrolysing of alkali metal chlorides." A. P. H. Dupire. March 16th, 1926. (267,912.)

Trade Mark Applications.

The following are among the recent applications for British trade marks. Objects against any of the proposed marks may be entered within one month from July 6th :—

B.I. (lettering and design). No. 478,925 All goods in Class 5. No. 478,927. All goods in Class 13. No. 478,929. Electrical insulating substances, conduits of wood or of other material for enclosing wires, &c.—British Insulated Cables, Ltd.

Reactone, No. 474,177. Class 8. Inductance coils, coil holders, and coil fittings.—W. Wolsey, 9, Gloucester Road, N.4.

Ipso. No. 480,343. Class 8. Electric batteries (not for medical purposes). —Die Elektro-chemische Fabrik Alfred Baehr Gesellschaft, Berlin. (British representative: D. Grabow, 19, Minster Road, West Hampstead, N.W.2.)

Fenbo (lettering and design). No. 481,166. Class 13. Electric lamps (ordinary) for use on motor-cars, motor-cycles, and the like vehicles.—B. B. Fenn, Ltd., 80, Edgware Road, W.2.

Gecoray. No. 481,169. Class 13. Electric light fittings made of metal. —General Electric Co., Ltd.

A Directory of American Laboratories.

The National Bureau of Standards, U.S.A., makes tests and carries out investigations for other Government departments, and because of the large amount of this official work, it is impracticable for it to make tests for private individuals if other laboratories can do the work. To inform interested persons of the location of other laboratories, the Bureau has compiled a list of the 207 commercial testing laboratories throughout the country, together with indications of the types of commodities which they are prepared to test. To accompany these there has been compiled a list of 143 colleges which are used not only for the purposes of instruction, but also to a considerable extent for research work; in fact, many important industrial research problems are being solved in the college laboratories. The list is being issued as Bureau of Standards Miscellaneous Publication No. 90. For the purpose of minimising the disadvantages incidental to the use of specifications, the Bureau has inaugurated a so-called "certification plan" in accordance with which there are compiled lists of manufacturers who have expressed their desire to supply material complying with certain selected nationally recognised specifications and willing to certify to the purchaser, upon request, that the material thus supplied is guaranteed to meet the requirements and tests of the specifications. This plan has already been applied to 48 United States Government master specifications. It would appear desirable that similar steps should be taken in this country.

New Work for Contractors.

Particulars of new works and building schemes for the use of electrical installation contractors in search of work and all interested in the sale of electrical and allied plant and other products.

Publication in this list is no guarantee that electrical work is definitely included. Alleged inaccuracies should be reported to the Editors.

ABERGELE.—Large shop premises opposite Bee Hotel, for Messrs. John Irwin, Sons & Co., Ltd., multiple shop grocers, Liverpool.

BARNSTAPLE.—Electric light installation, new public offices, The Castle, for the T.C.; borough surveyor.

BIRMINGHAM.—Bank, Stratford Road, Hall Green; F. H. Smith. Branch offices and depôt for gas department, Harborne; gas engineer. Removal of Blue Coat School to Harborne; governors. Extension of Woodlands Hospital, Northfield; secretary.

BLACK NOTLEY.—Sanatorium (£90,000); Essex county architect.

BLANTYRE.—Miners' welfare institute, with electrical and heating work; Cowie & Millar, architects, Cleland Road, Wishaw.

BOLTON.—Housing scheme, Moorfield estate (£17,000); borough engineer.

BRADFORD.—Extensions, College of Arts and Crafts; city engineer. Sun baths, Great Horton Road; city architect.

BROMLEY.—Administration block, isolation hospital, for the West Kent Joint Hospital Board; Percy Coad, architect, The Homestead, Nightingale Road.

BURY.—Waiting rooms and conveniences, Lowes Road, Manchester and Radcliffe Roads, and Walmersley and Jericho termini; J. A. Settle, borough engineer.

CANTERBURY.—Central heating and hot water system (£7,000), for the B.G.; clerk.

CHINGFORD (ESSEX).—Church (£8,000), for the Wesleyan trustees; George Baines & Son, architect, 121, Victoria Street, Westminster.

COLCHESTER.—Extensions, Royal Eastern Counties Institution (£250,000); Essex county architect.

DERBY.—Boys' secondary school (£71,746) for the borough E.C.; Gee, Walker & Slater, Ltd., builders. Hospital (£81,249), for the B.G.; T. H. Thorpe, architect; Gee, Walker & Slater, Ltd., builders.

DEVIZES.—Electric light installation, institution, for the B.G.; the clerk.

DUNFERMLINE.—Increased office accommodation for Carnegie United Kingdom Trustees; the secretary. Conversion of Bandrum Mansion house into children's home for Carnegie Dunfermline Trustees; the secretary.

EASTBOURNE.—40 houses, Corporation estate; Absolon, Ltd., of Penarth.

EASTLEIGH (HANTS).—Public hall (£11,000), for the U.D.C.; surveyor.

ECCLESHALL.—Central school, for the church school managers; Bernard Widdows, architect, Derby.

EDINBURGH.—Boarding house at Fettes College; the principal. New zoology department; principal, the University.

FIFESHIRE.—Nurses' home and houses (£30,000); A. D. Haxton, architect, Leven.

GATESHEAD.—Maternity home (£10,000), for the Gateshead Nursing Association.

GORSEINON.—Hospital (20 beds), for W. R. Lewis; G. Moxham, architect, 18, Castle Street.

GRAYS.—Bazaar premises, High Street, for F. W. Woolworth and Co., Ltd., Kingsway, London. Shopping centre, Southend Road; E. Fincham, architect.

HULL.—98 houses, Tween Dykes estate; F. Sewell & Son. Extensions, University College (£150,000); trustees. Alterations, Picturedrome, Holderness Road; licensee. Market buildings (£50,934), for the T.C.; borough engineer.

ILKLEY.—Additions to Middleton-in-Wharfedale Sanatorium; P. O. Platts, West Riding county architect, County Hall, Wakefield.

ILKESTON.—74 houses, Rutland estate and 40 southern site; borough engineer.

IRISH FREE STATE (DRUMCONDRA, DUBLIN).—Training college for the Department of Agriculture and Technical Instruction.

(DUBLIN).—Alterations to Mansion House (£8,600); city commissioners.

KIDDERMINSTER.—Houses (50), for the T.C.; Coulson and A. Willetts, builders, Dudley.

LEEDS.—Extensions, tram depôt, Swinegate; J. T. Wright and Messrs. Leonard Cooper, Ltd.

LONDON (ILFORD, E.).—Clinic block, isolation hospital, for the T.C.; Herbert Shaw, borough engineer.

(EDMONTON, N.).—Workshops, Technical Institution; Middlesex Education Committee.

(FINCHLEY, N.).—Catholic church; Rev. Father Joyce. 44 houses, Kimbolton estate, Regent's Park Road; A. H. C. Arnell.

(CAMDEN TOWN, N.W.).—Factory, Gordon House Road; Crowe & Careless, architects.

(ST. PANCRAS, N.W.).—Premises for Nettlefold & Sons, Euston Road and Upper Woburn Place; George Vernon.

(GREENWICH, S.E.).—Operating theatre (£4,000), for the B.G.; clerk.

(LAMBETH, S.E.).—Extensions, School of Printing, Stamford Street; L.C.C. Education Committee.

(BALHAM, S.W.).—Additions, Balham Picture House, High Road; C. Aish. Additions and alterations, Grange Mills, Grove Road; Grace & Marsh, Ltd.

(PUTNEY, S.W.).—Bottling store for Brandons Putney Brewery, Felsham Road; C. H. Simpson.

(STREATHAM, S.W.).—50 houses, Garden Village estate, Leigham Court Road; Truett & Steel. Alterations, Empire Picture Palace, High Road; H. Somerford and Son, Ltd.

(WIMBLEDON, S.W.).—Children's ward, Wimbledon Hospital, Tristran Road; R. J. Thomson. Offices, High Street; A.1 Concrete Block, Tile & Slab Co., Ltd. Additions, Elite Picture Theatre, Merton Road; R. Cromie.

MACCLESFIELD.—Additional 100 houses, for the T.C.; borough surveyor.

MANCHESTER.—Housing schemes (£609,000); Housing Committee.

MORECAMBE.—Warehouses and offices, Euston Road goods yard; W. J. Cross.

MOULTON.—Grammar school extensions; W. St. Leger Crowley, architect, 32, Hall Place, Spalding.

OTLEY.—Re-instatement, after fire (about £4,000 damage); Geo. Harrison & Sons, printers, Leeds Road.

OXFORD.—Extensions, Victoria Court; Oxford Times Co., Ltd.

PAISLEY.—Alterations for Greenlees & Sons, Ltd., boot manufacturers, Leicester; the manager.

PERSHORE.—Additional 72 houses, for the R.D.C.; F. B. Andrews & Son, architects.

PLYMOUTH.—Institute, Mount Gold (£7,000); Lord Astor. Children's block, Didworthy Sanatorium; borough engineer. Offices for borough treasurer at County Court Buildings (£15,000); borough engineer.

PONTEFRACT.—Elementary school (£15,950) at Willow Park, Baghill; W. H. Newton, borough engineer.

RAMSGATE.—Police offices, mortuary, ambulance station, &c. (£12,150), for the T.C.; borough engineer.

ROCHESTER.—Extensions, for Leonards, Ltd., drapers, 108-122, High Street.

SHENLEY.—Adapting hangars at mental colony for 100 patients; Middlesex C.C.

SHIPLEY.—Electric lighting installation, Bethel Baptist Chapel; A. Dyson, 4, Victoria Road, Saltaire.

SPENBOROUGH (YORKS.).—Electric light at Millbridge (Church of England) mixed and infants' schools; J. H. Linfield, clerk to U.D.C., Town Hall, Cleckheaton.

STOKE-ON-TRENT.—Houses (58), for the T.C.; Finney and Broadhurst, builders, Burslem.

SWADLINCOTE.—Houses (60), for the U.D.C.; E. Morley and Son, builders, Derby.

TILBURY.—Cinema, Civic Square (£25,000), for a syndicate; particulars from the U.D.C. surveyor.

WIGTON.—Grammar school extensions; J. Forster, architect, The Courts, Carlisle.

WORKSOP.—Housing scheme (£40,000), for the U.D.C.; surveyor.